Oral Health Surveys

Basic methods

SECOND EDITION

WORLD HEALTH ORGANIZATION
GENEVA
1977

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The World Health Organization (WHO) is one of the specialized agencies in relationship with the United Nations. Through this organization, which came into being in 1948, the public health and medical professions of some 150 countries exchange their knowledge and experience and collaborate in an effort to achieve the highest possible level of health throughout the world. WHO is concerned primarily with problems that individual countries or territories cannot solve with their own resources—for example, the eradication or control of malaria, schistosomiasis, smallpox, and other communicable diseases, as well as some cardiovascular diseases and cancer. Progress towards better health throughout the world also demands international cooperation in many other activities: for example, setting up international standards for biological substances, for pesticides and for pesticide spraying equipment; compiling an international pharmacopoeia; drawing up and administering the International Health Regulations; revising the international lists of diseases and causes of death; assembling and disseminating epidemiological information; recommending nonproprietary names for drugs; and promoting the exchange of scientific knowledge. In many parts of the world there is need for improvement in maternal and child health, nutrition, nursing, mental health, dental health, social and occupational health, environmental health, public health administration, professional education and training, and health education of the public. Thus a large share of the Organization's resources is devoted to giving assistance and advice in these fields and to making available—often through publications—the latest information on these subjects. Since 1958 an extensive international programme of collaborative research and research coordination has added substantially to knowledge in many fields of medicine and public health. This programme is constantly developing and its many facets are reflected in WHO publications.

FOR REVIEW
POUR ANALYSE

ORAL HEALTH SURVEYS

BASIC METHODS

SECOND EDITION

WORLD HEALTH ORGANIZATION
GENEVA
1977

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Second edition 1977

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INTRODUCTION

Basic oral health surveys, which enable the present status and future needs of a population to be estimated on a sound basis, supply reliable epidemiological data for developing national or regional oral health programmes and for providing effective oral health care. These basic survey data are particularly useful in planning manpower development and in establishing or expanding preventive and restorative services. In view of the importance attached by WHO to basic oral health surveys, the Organization is prepared to assist in their planning and also in analysing and summarizing data collected in country surveys (see p. 11).

In 1961 a WHO Expert Committee on Dental Health (*1*) formulated standard methods for reporting dental diseases and conditions in an effort to achieve international uniformity and comparability in oral health statistics. Four years later a WHO Scientific Group on Research in Dental Health recommended that in this field WHO should give priority to the development of international epidemiology, including the uniform classification of dental and oral diseases and the standardization of methods and techniques used in epidemiological studies. WHO's efforts to promote uniform classification of oral and associated diseases led to the appearance in 1969 of the *International Classification of Diseases—application to dentistry and stomatology (ICD-DA)*[a] in which the relevant classifications and terminology used in the 1965 revision of the International Classification of Diseases (*3*) are subdivided and expanded.

The International Dental Federation (FDI), other professional bodies, and individual scientists have made many valuable contributions to the development of methods for use in dental epidemiology (*4, 5, 6*). This manual owes a great deal to their work and to the experience gained through the use and testing of various epidemiological methods in national, regional, and local field surveys.

The first edition of this manual published in 1971 (*7*) stimulated much interest in the epidemiology of oral diseases. More than 30 health administrations have conducted oral health surveys in accordance with the recommended basic methods. Experience gained in these surveys shows that some of the recommendations made in the first edition should now

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[a] *International Classification of Diseases—application to dentistry and stomatology (ICD-DA).* Copenhagen, Munksgaard, 1969. This classification is regularly updated (see reference *2*).

be revised, especially with respect to the assessment of periodontal diseases. In addition, several health administrations have sought advice on how to achieve greater precision in estimating the need for, and evaluating, preventive, restorative, curative, and rehabilitative services. An attempt is made in this revised edition to provide for these requirements, at the same time preserving the original concepts so that valid intercountry comparisons can be made of data collected by use of the methods described in the first edition.

Suggestions for elective assessments were included in an annex to the first edition to provide for the collection of more detailed information where appropriate. Guidance on research and advanced application of the epidemiological process in the oral health area is now included in *Guide to oral health epidemiological investigation* (see p. 11), which also describes elective assessments, both new methods and those from the first edition.

Aims

The aims of this manual are as follows:

(1) to provide a systematic approach to the collection and reporting of data on oral diseases and conditions;

(2) to ensure that, as far as possible, data collected in a wide range of environments are comparable;

(3) to encourage dental health personnel in all countries to make standard measurements in oral diseases and conditions as a basis for planning and evaluating oral health programmes;

(4) to describe a systematic method for estimating the requirements for the application of preventive measures, including health education, and for curative, restorative, or palliative treatment; and

(5) to encourage the recognition and utilization of valuable opportunities for conducting epidemiological research.

To achieve these aims the manual provides:

(1) a description of diagnostic criteria that can be readily understood and applied in all countries, regardless of the concepts held and the training and experience of the oral health personnel;

(2) information on means of obtaining practical assistance in planning surveys, summarizing data, and analysing results.

Chapter 1 describes general principles for planning, organizing, and conducting oral health surveys; Chapter 2 deals with procedures for collecting basic data on oral health status; Chapter 3 describes procedures for the concurrent estimation of treatment needs and oral health status; and Chapter 4 explains how survey reports should be prepared. A list of the tables that can be prepared at WHO from data for both basic oral health and combined oral health and treatment assessments is given in the Annex to this manual.

1. DESIGN OF AN ORAL HEALTH SURVEY

Determination of Objectives

The objectives of a study determine the kinds of data that will be needed and the form in which they should be collected. Unless the objectives are clearly defined before a study begins, unnecessary data or data in unusable form may be gathered at considerable cost while data really needed may even be overlooked. Thus, the final objectives must be kept clearly in mind when oral health assessments are being selected for inclusion in a study to ensure that each piece of information is essential for planning, evaluation, or research purposes. It should be routine to ask the simple but searching question, "Why is this measurement included and what use will be made of the findings?".

The methods described in Chapter 2 can be used to obtain data for the following purposes:

(1) estimating the prevalence of specific oral diseases and conditions, and identifying variations in local, regional, or national groups;

(2) supplying baseline data for subsequent evaluation of oral health care programmes;

(3) supplying data to assist health administrators in determining priorities with respect to:

— health education and preventive and treatment services,

— the groups in most need of oral health care.

Data obtained from application of the methods described in Chapter 3 can be used for the same purposes. However, they can also be used to give a more accurate estimate of:

(1) the extent to which existing oral health services are coping with the current need for treatment;

(2) the nature and extent of required preventive, curative, and restorative services;

(3) the costs of establishing, maintaining, and expanding an oral health care programme, including an estimate of manpower requirements.

Selecting the Sample and Carrying Out a Pilot Survey

Once the objectives have been determined it is necessary to define the population groups to be included in the survey. Except in very unusual situations, it will be neither possible nor desirable to examine an entire population in order to obtain the oral health data needed for programme planning. In most situations sufficiently accurate data can be obtained from a representative sample of the total population. Sometimes, however, strict sampling routines will be impossible either because the community is scattered or because there is no population register. In such cases samples must be taken from each significant, distinctive, population group as circumstances and knowledge permit; the samples should be free from avoidable bias and sufficiently large to be representative. Individual sample means will then need to be weighted according to the population distribution in order to give an accurate estimate of the overall mean for the total population.

Estimating disease levels

Correct decisions on sampling cannot be made without at least some information about the nature of the conditions to be recorded and their variability within and between various strata of the population. Such information may be available from relevant literature or it may be gleaned from local records and/or local dentists or other health personnel and occasionally from lay persons familiar with the characteristics of the population. Even when such information is available it is desirable to conduct a small pilot study to reveal any oral conditions prevalent in the population that are not specified in the WHO basic oral health assessment form (see p. 31). A decision may then be taken as to whether such conditions should be added to the survey form (other conditions; boxes 24–26) and investigated as part of the main survey or whether a separate investigation

is justified. Investigators are referred to *Guide to oral health epidemiological investigation* for further guidance and assistance in conducting epidemiological investigations. [a]

A pilot study gives all personnel associated with the regular survey experience in working together and provides an opportunity for resolving any difficulties that may arise in the implementation of the survey instructions. This type of study may also be used for training recorders and by the examiners for standardizing their interpretation of diagnostic criteria and calibrating their examining techniques.

Sampling and obtaining assistance from WHO

The method of sampling is of critical importance and expert assistance in gathering health statistics should be obtained at the commencement of planning. This expert, or the statistician who ultimately will be responsible for the analysis of the results, should be involved at the planning stage. If adequate statistical help is not available WHO is willing to assist with survey planning, in particular with the choice of survey (basic or combined; see pp. 29 and 41) and sampling method. The aims of such assistance are to foster the use of uniform survey methods and to help investigators develop objectives and survey plans to meet specific local needs.

On request, WHO will supply the following survey materials, which are available in English and in French. [b]

(1) A checklist for survey planning and sampling design (see p. 12). Investigators are invited to complete this checklist or otherwise provide the same information in writing when requesting WHO assistance in survey planning or sampling.

(2) Various standard record forms (see pp. 31, 42, and 43), either single copies for reproduction locally or in bulk to cover survey requirements. (A supply of forms is kept at WHO and these are available to investigators who encounter serious difficulties in obtaining the forms they need.)

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[a] Elective methods for oral health assessment, which were included in the first edition of this manual, are now given in *Guide to oral health epidemiological investigation*. Copies of this document in English or French are available to investigators free of charge from Oral Health, Division of Noncommunicable Diseases, World Health Organization, 1211 Geneva 27, Switzerland.

[b] Requests for materials and assistance should be addressed to Oral Health, Division of Noncommunicable Diseases, World Health Organization, 1211 Geneva 27, Switzerland.

CHECK LIST OF DATA FOR SURVEY PLANNING AND SAMPLING DESIGN

Country: .....

Principal Investigator: .....

Address: .....

.....

Area(s) or region(s) to be surveyed: .....

.....

POPULATION OF AREA (estimate)	SCHOOL-AGE POPULATION (estimate of number or percentage)	SCHOOL-ATTENDING POPULATION (estimate of number or percentage)
.....	.....	.....
.....	.....	.....

Best information or estimate of disease level in population*:

CARIES	PERIODONTAL DISEASE	OTHER (SPECIFY)
.....	.....	.....
.....	.....	.....
.....	.....	.....

*Please supply survey data if available - if not, please estimate prevalence as high, moderate, or low at 6 years, 12 years, and for adults.

Important subgroups or divisions in population (indication of which subgroups are important and why):

Urban/rural: .....

Ethnic: .....

Religious: .....

Dietary regime: .....

Habits, e.g. betel or tobacco use, ritual abrasion etc: .....

.....

Education levels: .....

Socioeconomic levels: .....

Oral health services in operation or being planned (please give brief description under the headings of):

Emergency: .....

Preventive programme: .....

School services: .....

Other services: .....

Private practice: .....

Personnel and finance available for study: .....

Size of survey population ☐ Do you wish to make duplicates? ☐

(3) Survey summary sheets (see pp. 53 and 54).

(4) Leaflets for field use with basic oral assessment and combined oral health and treatment forms, and providing examination criteria and codes (see p. 24, footnote *a*).

Additional copies of this manual may be purchased through the sales agents listed on the back cover or ordered directly from WHO. [a]

At an investigator's request, WHO is also prepared to assist in summarizing and analysing data derived from the use of procedures recommended in this manual provided that the standard coding in the manual has been used for the survey forms. The analysis will be carried out, without fee, according to a standard computer programme, which will produce a standard set of tables (see Annex). A brief summary of the final results of all data analysed by WHO will be automatically included in the WHO global oral epidemiology data bank.

It should be noted that, even if WHO assists with the planning, analysis, or funding of a survey, it is the investigator's responsibility to obtain permission from the responsible authorities to conduct the survey. It is especially important that the investigator should obtain local permission to carry out a survey in a country or locality of which he is not a national or local resident (see *p. 17*).

Population subgroups

The assistance given by a local statistician or by WHO will be vital in deciding which population subgroups are significant for the objectives of the study and should be represented in the final sample. Factors such as an urban or rural environment, socioeconomic or educational levels, religion, dietary habits, or occupation may help to determine oral disease levels or the demand for services. It is necessary to make a careful selection of the age groups or single-year groups to be sampled, and in special circumstances the subdivision of findings by sex is required. However, because there is usually only a small, though consistent, difference in oral disease status between the sexes, and because it is usually possible to sample nearly equal numbers of males and females, separate detailed analysis of findings by sex is not normally necessary when the data are used for planning purposes. Therefore, the WHO standard data summary provides a breakdown by sex only on request. In selecting subgroups,

[a] Address for orders: Distribution and Sales Service, World Health Organization, 1211 Geneva 27, Switzerland.

including age groups, the investigator must be extremely careful not to introduce so many that individual subgroups are too small to give meaningful results (see below).

Standard age groupings

Since the prevalence of various oral diseases and pathological conditions usually increases with age, a presentation of the findings by age is very important. The data should be tabulated by single-year, age-specific findings for the years selected up to and including 19 years, and thereafter in 5-year and 10-year age groups as follows: 20–24, 25–29, 30–34, 35–44, 45–54, 55–64, and 65 years and over. It should be noted that this represents a change from the age groups used in the first edition of this manual, but only for ages under 20 years.[a] It cannot be too strongly emphasized that no more single-year groups or age groups should be selected than are required to meet the objectives of a particular study and that the sample size should be kept as small as possible. For example, even in a comprehensive evaluation of oral status to serve as a basis for estimating school dental service requirements, it would be sufficient to examine only subjects aged 6, 9, 12, 15, and 18 years in order to obtain an assessment of the overall problem.

Thus, the composition and sizes of relevant subgroups, the age structure of the total population, the precision with which the oral health status must be estimated, and the amount of variation than can be expected must all be considered before the total sample size for a survey can be established.

Sample size

The size of the sample is determined largely by the precision required in estimating the oral health status of the population and also by the expected level of variation in the oral conditions being assessed. In general, the greater the precision required the larger the sample needed. For example, whether the estimate of average number of decayed, missing, or filled (DMF) teeth in a population is accurate to the nearest 1 DMF tooth or to 0.01 DMF tooth makes little difference in formulating plans for a treatment programme, but makes a very big difference in required sample size and, therefore, in survey costs.

Mean scores or averages based on samples are only estimates. They really indicate to the planner or investigator that the true population

[a] In the first edition of this manual data for ages 15–19 years were grouped.

mean or average can be taken to lie between certain limits on either side of the estimate. These limits can be calculated by statistical procedures. If, for example, an average DMF score is 8 DMF teeth for a particular population sample, this may indicate that in most cases the true population mean is between 7 and 9 DMF teeth if a small sample has been used, or that it lies between 7.9 and 8.1 DMF teeth if the sample was relatively large.

After the required level of precision has been decided, the expected level of variation must be estimated in order that the sample size can be calculated. In other words, it has to be determined whether the population is very uniform with respect to a particular oral condition or whether many persons vary markedly from the population average. The greater the variation from the group average, the larger the sample needed for a given level of precision.

The expected variation in the oral conditions being measured may be assessed from the results of a pilot study, but a good approximation of the variation for a particular disease or condition will often be available from another study of the same, or a similar, population.

As a practical guide to sample size, the following example is based on dental caries data. Approximate subgroup sample sizes required for three levels of precision between 0.5 and 1.0 DMF tooth are given in the following tabulation. Experience has shown that these levels are sufficient for planning procedures and that in the most usual case—namely, ±1.0 DMF tooth—each subgroup should contain approximately 100 subjects.

Precision required in DMF teeth	*Sample size (95 % confidence level)* [a]
± 0.5	400
± 0.7	200
± 1.0	100

[a] 95 % confidence level means that an investigator can expect the true mean for a population to lie between the stated limits 95 times out of 100.

These figures were calculated for populations having a high prevalence of caries (e.g., 4 or more DMF teeth at 12 years) and a wide variation in DMF scores. For populations with a low prevalence of caries the range of variation will also be lower, and sample sizes could be reduced to one-half or even less while maintaining precision limits within the range 0.5–1.0. However, in no circumstances should a subgroup (i.e., a single cell after subdivision by ethnic group, location, age, or any other factor) number less than 20. Only in exceptional circumstances will subgroups

containing fewer than 20 subjects be separately summarized by the WHO standard data programme. Instead, a note will be printed indicating that these subgroups were too small for separate analysis.

Pathfinder Survey

As a specific case, and in recognition of the fact that time and personnel for comprehensive oral health surveys are very limited, the concept of a "pathfinder" survey is introduced. This type of survey is intended to be an economical and practical way of obtaining data for health service planning by limiting the number of age and other groups as far as possible.

In this type of survey a few index ages are selected, usually children aged 6 years and 12 years and one adult age group, often 35–44 years. In this way, oral health status at entry to, and exit from, primary school is assessed in children, while the adult group should provide an estimation of the ultimate caries and periodontal disease pattern of the community.

Sampling sites should be selected to cover a good range of geographical conditions and a representative cross-section of the population. About 20 subjects in the index ages or age ranges should be examined at each site. Usually, between 10 and 15 sampling points are sufficient in any one country but if large urban proliferations are included it might be necessary to locate several additional sampling points in each city.

Schoolchildren are the most accessible group in any population and most of the sample will be drawn from this group. However, in some countries large numbers of school-age children do not attend school; here, an endeavour should be made to survey additionally two or three groups of non-attenders, widely separated geographically, in order to compare their oral health status with that of children going to school.

Sampling adult subjects is difficult and is often not feasible unless a sample can be drawn from organized groups such as factory workers. Use may also be made of readily accessible groups, at a market, for example, to obtain a reasonably representative sample in situations where truly representative sampling is impossible. Care must be taken to avoid obvious bias such as sampling dental clinic outpatients.

Clearly, subgroups of 20 subjects for each of the index ages provide less precision than subsamples in a comprehensive survey. Nevertheless, the composite sample of 200–300 for each age group, i.e., 20 subjects at 10–15 sites, is well within the recommended precision limits for planning purposes.

Approval and Scheduling

Approval

Usually, permission to examine population groups must be obtained from a local, regional, or national authority. If school populations are to be examined, for example, school authorities should be approached and the purpose of the survey explained to them; their approval for the programme should be obtained to ensure full cooperation. In some areas, written permission from parents must be obtained before children can be examined. The survey planner should also notify the health authorities since it may be necessary to time the survey to fit in with other health activities; this applies particularly when adult populations are to be surveyed.

It is most important to acquaint the dental profession and dental administrators in the area with details of the survey. Officers of dental societies and local dental practitioners can often help to gain cooperation for the survey in the community and among their patients who may be included in the sample.

Scheduling

One of the most important aspects of planning a survey is the preparation of an orderly schedule for data collection. If this is not done, examining personnel may waste valuable time waiting for subjects to arrive or otherwise experience unnecessary delays.

The survey planner can estimate from the pilot survey, or from previous experience, how much time on average each examination will take.[a] A daily and weekly schedule can then be prepared; this should be made available to survey personnel and to school and health authorities. The schedule should allow for some flexibility so that unexpected delays do not cause major upsets in the survey timetable.

Reliable observations and consistent judgements are also important in surveys. Since fatigue contributes significantly to inaccuracy and inconsistency it is unwise to make the schedule too demanding. The planner may wish to obtain assistance from WHO in estimating the maximum number of examinations to conduct per day.

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[a] During the pilot survey, if the actual time taken for each examination is recorded, the schedule for the survey examinations can be adjusted in accordance with the average time required for an examination.

Emergency care

All survey teams should be equipped and ready to provide emergency care if required. This service is especially important in remote areas where there are no regular oral health services. However, if any doubt exists permission should be obtained from the competent authority for members of the survey team to give emergency care.

Courtesy reporting

It is appropriate, and often essential, to report the survey findings to local authorities. The report may be a simple summary of the number of subjects examined and the observations of the examiner, which can usually be delivered promptly, or a full, technical report, which will require more time to prepare. Occasionally, both types of reports will be necessary.

"Calibrating" the Examiners

Although examiners may differ in their assessments of the oral health status of individuals, they should be in close agreement in assessing the status of population groups. Whenever an epidemiological survey is undertaken by a team, it is essential that the participating examiners be trained to make consistent clinical judgements. There are two main reasons for variability in examiners.

(1) Chronic diseases such as dental caries and periodontal disease begin as microscopic lesions that cannot be diagnosed by clinical methods. Until these disease processes have reached a relatively advanced level they may be practically undetectable, easily missed, or inconsistently detected.

(2) Physical and psychological factors, such as fatigue, fluctuations in interest in the study, difficulty in making decisions, and variations in visual acuity and tactile sense, all affect the judgements of examiners from time to time and to different degrees. Moreover, different disease prevalence rates may interact with these factors to affect the consistency of clinical observations.

The objectives of standardization and calibration are:

(1) to ensure uniform interpretation, understanding, and application

of the criteria for the various diseases and conditions to be observed and recorded;

(2) to ensure that each examiner can examine to a consistent standard and that variations between different examiners are minimized.

This manual is designed to facilitate the achievement of the first objective by defining criteria in clear and precise terms. The best method for fulfilling the second objective will depend on the number of examiners taking part in the survey. When only one examiner is involved, he should determine how consistently he can apply the diagnostic criteria by examining a group of at least 20 patients twice, on two successive days. These patients should be preselected so that they possess, collectively, the full range of conditions expected to be assessed in the main survey. By comparing the results of the two examinations, the examiner will be able to obtain an estimate of the extent and nature of his diagnostic errors. If the number of errors is large he should review his interpretation of the criteria and conduct additional calibration examinations until he can achieve acceptable consistency in his assessments.

Although it is not possible to give a precise definition of "acceptable consistency", examiners should attempt to achieve at least 80 % agreement between the results of duplicate examinations. The percentage agreement attained will depend on the measurement being considered. For example, more consistent results would be expected for a count of teeth present than for an assessment of decayed teeth or intense gingivitis.

When the survey is to be conducted by a group of examiners it is necessary to assess not only the consistency of each examiner in the manner just described, but also the variations between examiners. This can be done by asking each examiner to examine the same group of 20 or more patients. When collective findings contain major discrepancies subjects should be recalled in order that differences in diagnoses can be reviewed by the examiners and resolved in group discussions. It is essential that a group of examiners should be able to examine with reasonable consistency, using a common standard. If some examiners consistently record significantly more or fewer items than the majority and attempts to correct their performance fail, they should be excluded from the survey team. All potential examiners should understand clearly before the calibration trials begin that aptitude to standardize examination methods and results is not a measure of clinical ability.

Unless all members of the survey team can examine in a consistent manner, regional or group variations in disease prevalence or severity may be missed or wrongly interpreted. Since there will always be some

variation between examiners it is advisable that, in the actual survey, they should all examine similar proportions of each major group of the sample population.

Duplicate Examinations

Some examiners may change the way they apply diagnostic criteria during the course of a long series of examinations. To reduce this tendency, and to measure its extent, it is advisable for each examiner to conduct duplicate examinations of about 10 % of the sample in the main survey. As far as possible, the examiner should not be able to identify the subjects who are re-examined, or know that a subject has been examined previously, since this information is likely to affect the thoroughness or quality of re-examinations. The recorder or a third person, perhaps a local schoolteacher, should be requested to arrange for the re-examination of 10 % of the subjects surveyed during the course of each day's work. Since information on ability of examiners to replicate findings is essential for proper assessment of the reliability of data, the results of duplicate examinations and the calibration trials should be included in the final report of the survey.

If subjects chosen for the standardization and pilot trial are representative of the general population with respect to age, sex, and ethnic origin, the results will provide a tentative assessment of the conditions likely to be encountered in the main survey. This preliminary information will greatly facilitate final planning, scheduling, and determination of sample size.

Organizing the Survey

General

Those in charge of a survey may find it helpful to contact various people in authority to obtain general and specific information that could be useful to the survey. For instance, a schoolteacher or school principal knows when the school is in session, when the children are available for examination, which room or area could be used for the examination, and whether senior pupils could be used to help in directing subjects to the examination and in recording general descriptive information.

The dental examiner should record in a diary the location of each day's examination, the number of persons examined, and any unusual findings or events. Occasionally, observations are made, and impressions formed, that have an important bearing on later assessment of survey results. If these are not described clearly at the time of observation they will either be forgotten or confused.

Survey personnel

Each examiner should be assisted by an alert and cooperative recording clerk who is able to follow instructions explicitly and print and record numerals clearly (see also p. 25). The examiner should give the clerk clear instructions about recording data on the survey form. The clerk should be told the meaning of the terms that will be used and instructed in the coding systems so that, with practice, he can recognize obvious mistakes made by the examiner. Before the survey begins, the clerk should practise by recording findings from a few simulated examinations. Special instructions and additional practice must be given to the clerk if he is not familiar with the alphabetical or numerical symbols used on the survey form. This is especially important in recording dental caries because the same coding boxes are used for both the primary and permanent dentitions. The only distinction is in the notation used: letters for primary teeth and numbers for permanent teeth (sse p. 38). Failure to ensure that the recording clerk makes clear entries may result in confusion between symbols and render the survey data useless.

It is also desirable to have an organizing clerk at each examination site to maintain a constant flow of subjects to the examiner or examiners and to enter general descriptive information on the record forms. The organizing clerk should also scan the finished records for accuracy and completeness so that missing information may be obtained before the survey team moves to another location. If possible, a person should be available to sterilize and maintain an adequate supply of instruments for examiners.

It is very important that the examiner review each day's record forms the same evening for completeness and accuracy of recording.

Instruments and supplies

The quantity and weight of instruments and supplies used in the survey should be kept to a minimum. The following instruments and supplies are required for each examiner in both types of survey:

(1) sharp explorers of the sickle-shaped type,

(2) plane mouth mirrors,

(3) periodontal probe (3-mm disc or shank graduation needed),

(4) pans for sterilizing instruments,

(5) wash basins (one for plain water and one for water with soap or cold sterilizing solution added),

(6) disposable paper towels,

(7) gauze pads for removing debris from around the teeth.

Sufficient numbers of instruments should be available to avoid the need to interrupt examinations while used ones are sterilized. Ideally, enough instruments should be available to last half a day so that they can be left in cold sterilizing solution during the mid-day break. As a minimum, a sufficient number of instruments should be provided for at least 1 hour of examinations (approximately 30 sets); this will permit some instruments to remain undisturbed in sterilizing solution for not less than 30 minutes while the others are being used.

A light-weight portable dental chair with a head-rest for the patient is desirable but not essential since a portable head-rest that can be clamped on to the back of a straight chair will suffice. If neither of these is available it may be necessary to use a straight chair with a tall back on which the patient's head can rest. For examiners, a chair than can be adjusted for height is useful in preventing fatigue through bending down to examine small children.

The lighting should be as consistent as possible throughout the survey. If electricity is available at all locations, a light-weight portable examination light (blue-white, not incandescent) should be used. Inflammatory changes of the oral tissues are more difficult to detect under incandescent light than under natural or corrected artificial light, but if artificial light is used natural light should be excluded as far as possible. When electricity is not available at all examination locations artificial light should not be used at any of the locations.

Arranging the examination area

The area for conducting examinations should be planned and arranged for maximum efficiency and ease of operation. The exact arrangement will be determined by the physical condition of the site, but certain controllable features should be kept in mind.

(1) If an artificial light source is used, the location of an electrical

supply point will largely affect the positioning of the chair. If artificial light is being used and there is also a natural light source for the room in which examinations will be made, the examining chair should be placed to face away from the natural light source to avoid variation in illumination. However, if natural light is being used the subject should be seated in such a position as to receive maximum illumination, but no direct sunlight should fall on either the patient or the examiner. If light enters through a window or other opening, the chair should face the opening and be placed as close to it as possible.

(2) A table or platform to hold dental instruments and basins should be within easy reach of the examiner when he is an examining position beside the subject.

(3) The recording clerk should face the examiner so that he can easily hear instructions and codes and the examiner can see that findings are being recorded properly. In this position also the recorder is able to check that the region or tooth called is in fact the region or tooth that has just been examined.

(4) A generous supply of survey forms, carbon paper, hardboard bases and clips, sharpened pencils, and a copy of the recording instructions and measurement criteria should be kept readily available.

(5) If possible, the examination area should be partitioned or arranged in such a way that subjects enter at one point and leave at another.

(6) Subjects should not be permitted to crowd around the examiner or recorder but should approach the examination chair one at a time.

It is important to realize that lack of a suitable building does not preclude the conducting of a survey. If necessary, examinations can be performed in the open at the edge of a shady area.

Survey forms

Suitable forms for recording the oral health assessments described in this manual are reproduced on pages 31, 42, and 43. As stated on page 11, supplies of these forms are available from WHO on request, but investigators should preferably arrange to have them reproduced locally. It is strongly recommended that survey forms should be completed in duplicate as a safeguard against loss.

Each recorder should use a board with a clip at the top to hold the recording forms and carbon paper in position. Although this entails extra work it is a worthwhile precaution, especially when surveys are being

conducted in remote or inaccessible areas where transport may not be entirely reliable. Alternatively, completed forms may be packed and dispatched by post or carrier to the analysis centre at the end of each day's or week's work. In this way the risk of losing all the data is greatly reduced.

Standard codes should be used for all forms and all parts of forms. If this requirement is not observed WHO cannot perform the data processing and summarization because the standard computer programme will be unsuitable. Even where some of the oral health assessments are not being used or are not applicable to the population, the codes must remain unchanged and the unused sections of the form be cancelled with a diagonal line. A complete set of criteria and codes for recording survey data can be obtained from WHO and should be distributed to all members of the examining team. [a]

The *basic oral health assessment form* (p. 31) is designed for recording the minimum number of items that will provide a meaningful assessment of the oral health status of a population, but it is recognized that the objectives of some surveys will allow for the omission of certain items.

The *combined oral health and treatment assessment form* (pp. 42 and 43) is designed for recording more detailed information that can be used not only to describe the oral heath status of a population but also to form a basis for estimating the need and demand for preventive and treatment services in that population.

It should be noted that some additional conditions, such as enamel opacity and mottling, whether of fluoride or non-fluoride origin, and oral habits, can be recorded in the "other conditions" sections of either the basic or the combined assessment forms if appropriate codes are constructed. Codes used in this section should be listed and identified in the survey summary sheets given on pages 53 and 54. If the pilot survey indicates that additional assessments are required, suitable methods and indices, complete with coded charts, for gathering such data can be found in *Guide to oral health epidemiological investigation* (see p. 11).

The forms are designed to facilitate subsequent computer processing

[a] Leaflets providing examination criteria and codes have been prepared for field use with the basic oral health assessment form and with the combined oral health and treatment assessment form. Copies of these leaflets in English or French are available to investigators free of charge from Oral Health, Division of Noncommunicable Diseases, World Health Organization, 1211 Geneva 27, Switzerland. The particular leaflet required should be clearly specified.

of the results.[a] Recording codes are shown near the appropriate boxes. Each box is given a code number (the small numbers in parentheses) that represents a column on a computer punch-card. To reduce the number of errors, all entries must be clear and unambiguous. Confusing similarities commonly occur in writing 1 and 7, 2 and 4, and 6 and 0. To avoid confusion and the danger of computing inaccurate results, numerals should be printed clearly in the following manner:

1234567890

When letters are used instead of numbers, as in recording the status of primary teeth, each letter should be capitalized as follows:

ABCDEMX

(Note the arms on the "D" to avoid confusion with "0".)

Clear enunciation is essential in calling out scores to recorders in order to differentiate unmistakably between similar sounding codes, e.g., eight and A. Adoption of a word system such as the international airline system—*able, baker,* etc.—may be useful.

The numbers above the boxes are for tooth identification; the two-digit system adopted by the FDI in 1970 is used. The first digit specifies the quadrant of the mouth, the second the actual tooth.

Permanent teeth

(upper right)															(upper left)
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
(lower right)															(lower left)

Primary teeth

(upper right)									(upper left)
55	54	53	52	51	61	62	63	64	65
85	84	83	82	81	71	72	73	74	75
(lower right)									(lower left)

In designating a tooth, some examiners may prefer to call the quadrant number, then the tooth number—for example: the upper right

[a] It will be noted that the basic assessment form (p. 31) comprises cards 1 and 2, and that the combined oral health and treatment form (pp. 42 and 43) comprises cards 3 and 4. These cards are of significance only for computer processing.

second incisor, "one—two" rather than "twelve"; the lower left third molar, "three—eight" rather than "thirty-eight".

Identification Section of the Survey Forms

Both survey forms contain the same personal and demographic information, which should be recorded as follows. Boxes 1 and 2 on the form indicate the code number of the investigation for computer handling and boxes 3, 4, and 5 are reserved for the WHO code for the country in which the survey is carried out. The investigator is requested not to fill in these boxes. However, the investigator should not fail to write the name of the country in which the survey was conducted in bold letters on the first page of each batch of forms sent to WHO for processing.

Date of examination

The day, month, and year should be written in block letters on the form at the time of the examination. Usually, only the year will be entered in the computer. The year should be written in boxes 6 and 7, e.g., *76* (i.e., 1976). Recording the day and month enables an investigator to refer back to any one day's examinations that may need to be reviewed in relation to survey notes.

Registration number

Each subject, beginning with the first to be examined, should be given a registration number. This number should always have the same number of digits as the total of subjects to be examined. Thus, if it is intended to examine some 9000 subjects the first subject is numbered 0001. These numerals should be entered in boxes 8 to 11.

If possible, the registration numbers should be entered on the forms before the day's work commences. If the combined oral health and treatment assessment is being used and the format is the same as that prepared by WHO, i.e., a single sheet printed on both sides, it is not necessary to enter the registration number on both sides. If, however, forms are printed on one side of the sheet only and there are two separate sheets it is necessary to enter the registration number and date on the second sheet in the code boxes provided.

It is important to ensure that each registration number is used only *once*. Cross-checking is necessary when more than one examiner parti-

cipates in a survey. If a total of 2000 subjects are to be surveyed by two examiners, examiner 1 should use numbers 0001–1000 and examiner 2 numbers 1001–2000.

Duplicate examinations

If the recorder is responsible for organizing duplicate examinations he or she should identify the subject and place a code "1" in box 12[a] for the first examination at the end of that examination and a code "2" in box 12 after the duplicate examination. If a third person has organized the duplicate examination he should indicate to the recorder, but not to the examiner, which subjects are being re-examined. The data from repeat examinations should not be used in the analysis of survey results. A separate table should be prepared with comparisons of duplicate and first examinations.

Sex

This information should be recorded at the time of examination because it is not always possible to tell a person's sex from name alone. The appropriate code (1 for male, 2 for female) should be entered in box 13.

Age

Age should be recorded as age at last birthday. It may not always be possible to obtain this information from young subjects. When the subject's age cannot be obtained from school records, official records, or parents, it may be necessary to make an estimate on the basis of physical development, stage of tooth eruption, tooth wear, or by questioning a subject on historical events in his community. Local residents may be able to provide valuable assistance in the last approach. Age should be expressed according to the international convention whereby age at birth is 0 years. In communities where age is normally expressed in some other way, a conversion must be made. Where age has been estimated, the manner of estimation should be reported. The age in years should be entered in boxes 14 and 15. If the age is less than 10 years, "0" should be entered in box 14.

[a] If the combined assessment form is used as two separate sheets (as shown here, pp. 42 and 43) this code should be entered in box 12 on both sheets.

Name

The name of the subject should be written in block letters, beginning with the family name.

Coding

Codes employed in the survey should be selected in consultation with the study statistician or WHO, as appropriate, and recorded on the summary survey sheets (see pp. 53 and 54).

Ethnic group and occupation

In different countries, ethnic and other groups are identified in different ways, e.g., by area or country of origin, race, colour, language, religion, or tribal membership. There are as yet no internationally accepted criteria for this purpose. Local health and education authorities should be consulted before deciding which ethnic groups should be recorded. When this decision has been reached, a coding system should be devised. Since it is often not possible to identify a person's ethnic origin from name alone, ethnic group information must be recorded at the time of the examination and coded in box 16.

An international classification of occupation exists [a] but the designated groups are not suitable for studies of the kind described in this manual. Therefore, government authorities should be consulted before the occupation groups to be recorded are selected. When this has been done, a coding system should be devised. At the time of examination, the appropriate code is entered in box 17.

For some surveys, information on ethnic origin and/or occupation may not be required. In that case, boxes 16 and 17 may be used to give more specific information on ethnic group or occupation or on diet, religious customs, origin of water supply, etc. For example, it may be desirable to provide results separately for socioeconomic levels within ethnic groups and to ignore occupation, or to classify occupation by educational level and not to include information on ethnic group.

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[a] International Labour Office. *International standard classification of occupation.* Geneva, 1968.

Geographical location

The site where the examination is conducted may, if desired, be written in block letters in the space provided, or a code may be used. Since more than 9 locations may be included in one survey 2 boxes are provided for coding location. The appropriate code number should be entered in boxes 18 and 19.

Examiner

If more than one examiner is participating in the survey each examiner should be allotted a number. The examiner's number should be entered in box 20 on all forms.

2. BASIC ORAL HEALTH ASSESSMENT

The basic oral health assessment (see p. 31) is designed to determine the nature and extent of oral diseases or other conditions in the community for the purpose of planning and developing an oral health programme. Although some of the items included in the basic assessment may not be essential for all surveys, the complete set of measurements represents a useful standard for comparisons between countries or regions. *However, if single items or whole sections are omitted they should be cancelled with a diagonal line and in no case should the standard coding on the form be changed.*

Even simple planning for a national health programme must be based on an assessment of the prevalence of periodontal diseases and related factors such as accumulations of calculus and plaque, full denture status, the frequency of dental caries, and the unusually frequent occurrence of any other oral disorder. It is also desirable to make some measurement of the prevalence of dentofacial anomalies. In countries where personal habits, environmental factors, general health conditions or specific systemic diseases that may affect the oral tissues are highly prevalent it is essential to at least take note of such conditions and to include a statement about their relevance for oral health in the survey report.

The simple examination routine described in this chapter follows the order of sections on the basic assessment form.

Disorders of Mucosa, Teeth, and Bone and Other Conditions

A screening examination of the oral mucosa and the hard and soft tissues in and around the mouth should be performed for all subjects included in the survey, preferably before the teeth and periodontal tissues are examined. The examination should be thorough and systematic. For instance, the examiner may begin with the lips, proceeding to the right buccal mucosa, including the upper and lower sulcus and retromolar area, the upper and lower labial mucosa, and the left buccal mucosa. The palatal mucosa and the surface and margins of the tongue should be inspected, and the mobility of the tongue checked. Finally, the inferior surface of the tongue and the floor of the mouth should be examined. Examination of the oral mucosa is facilitated by using two mouth mirrors to retract tissues as well as for inspection. The entire dentition should be thoroughly screened for tooth defects and for evidence of trauma. Mucosal or facial tissues that seem to be abnormal, as well as the submandibular, sublingual and cervical lymph nodes, should be palpated digitally.

Spaces are provided on the assessment form for recording diseases of the mucosa (21), defects of teeth (22), and disorders involving bone (23). If any of these conditions is detected, write "1" in the appropriate box and enter the condition(s) in clear hand-printed letters in the space(s) provided. This information will be tabulated manually. The form also provides space for recording other conditions, which should be specified in boxes 24–26. Diagnostic criteria and codes for additional conditions recorded should be defined and noted on the survey criteria leaflet (see p. 24, footnote *a*) before the main survey begins.[a]

Examples of sociocultural habits that may be of interest and that should be noted, but not necessarily coded, in a basic oral health assessment are mouth cleansing habits such as toothbrushing, mutilation of teeth, betel nut chewing, tobacco smoking, and special dietary customs. Likewise, information on environmental conditions that could produce oral manifestations might be useful; for example, the presence of optimal or excessive amounts of fluoride in water or consumption of diets that could be associated with low prevalence of dental caries. Of possible interest in some surveys are certain general health conditions or systemic diseases such as blood dyscrasias that may produce oral manifestations. Also, the use of tetracycline and some other antibiotics can cause discoloration of teeth.

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[a] Codes used in this section must also be noted on the survey summary sheets, pp. 53 and 54.

WHO BASIC ORAL HEALTH ASSESSMENT FORM

Note 1 No codes to be changed. 2 Unused sections to be cancelled by diagonal lines

(1) J 2 (5) Study Number Date 19 (6) (7) Registration Number (8) (11) Examination Number (for duplicates) (12)

PERSONAL AND DEMOGRAPHIC INFORMATION

Sex M=1 F=2 (13)

Age in years (14) (15)

Ethnic group (16)

Occupation (17)

Name family other

Geographic location (18) (19)

Examiner (20)

DISORDERS OF MUCOSA, TEETH AND BONE
Absent=0 Present=1

ORAL MUCOSAL DISEASES
Specify (21)

DEFECT OF TEETH
Specify (22)

DISORDERS INVOLVING BONE
Specify (23)

OTHER CONDITIONS
Titles to be entered as needed from results of pilot study

(24)

(25)

(26)

DENTOFACIAL ANOMALIES Absent=0 Present=1
WHO criteria
Condition specify (27)
Other criteria (to be specified) (28)

FULL DENTURE STATUS
WEARING FULL DENTURES
NONE 0
UPPER 1
LOWER 2
BOTH 3
(29)

PERIODONTAL STATUS Absent=0 Present=1

SOFT DEPOSITS	max.	(30)	(32)
	mand.	(33)	(35)
CALCULUS	max	(36)	(38)
	mand.	(39)	(41)
INTENSE GINGIVITIS	max	(42)	(44)
	mand	(45)	(47)
ADVANCED PERIODONTAL INVOLVEMENT	max.	(48)	(50)
	mand.	(51)	(53)

NB. Central segments include cuspids and incisors, left and right segments include molars and premolars

CARD No (80) 1

DENTAL CARIES STATUS

55 54 53 52 51 61 62 63 64 65
18 17 16 15 14 13 12 11 21 22 23 24 25 26 27 28
(13) R L (28)

85 84 83 82 81 71 72 73 74 75
48 47 46 45 44 43 42 41 31 32 33 34 35 36 37 38
(45) (60)

	PRIMARY	PERM
SOUND	A	0
DECAYED	B	1
FILLED & CARIES FREE	C	2
FILLED WITH PRIMARY DECAY	D	3
FILLED WITH SECONDARY DECAY	E	4
PRIMARY TEETH MISSING DUE CARIES (UNDER 9 YRS ONLY)	M	–
PERMANENT TEETH MISSING DUE CARIES (UNDER 30 YRS ONLY)	–	5
PERMANENT TEETH MISSING ANY REASON OTHER THAN CARIES (UNDER 30 YRS ONLY)	–	6
PERMANENT TEETH MISSING ANY REASON (30 YRS & OLDER)	–	7
UNERUPTED TOOTH	–	8
EXCLUDED TOOTH	X	9

CARD No (80) 2

WHO 5296 ORH (6/76) 20000

Conditions or diseases of the oral mucosa to which examiners should be alert during screening examinations, and for which a tentative diagnosis should be recorded, include the following: [a]

Acute necrotizing ulcerative gingivitis	(101.X0)
Acute necrotizing ulcerative stomatitis	(101.X1)
Suspected oral cancer	(140–146)
Oral lichen planus	(697.0)
Leukoplakia of oral mucosa	(528.6)
Odontogenic fibroma	(213.X1)
Candidosis	(112.X0–112.X9)

Defects of teeth that should be recorded on the basic oral health assessment form include: [a]

Supernumerary teeth	(520.1)
Hypoplasia of enamel	(520.40)
Fractured enamel	(N873.70)
Fractured crown and root	(N873.74)
Erosion of teeth	(521.3)
Abrasion of teeth	(521.2)
Excessive attrition of teeth	(521.1)

The following conditions are among those that should be recorded in the category of disorders involving bone: [a]

Radicular cyst	(522.80)
Osteoma	(210)
Osteitis (osteomyelitis)	(526.40)
Ameloblastoma or other odontogenic tumour	(140–146 or 210)

Dentofacial Anomalies

There is at present no universally accepted method for the assessment of dentofacial anomalies that are of public health significance and require treatment. Nevertheless, dentists in a number of countries have to provide orthodontic advice to parents and children. Similarly, public health authorities may be required to estimate the prevalence of dentofacial anomalies so that orthodontic treatment can be made available for those who need

[a] The terms are those used in *Application of the International Classification of Diseases to dentistry and stomatology (ICD-DA)*, 1973 edition (*2*). Since a revision of the ICD-DA is due to be published in 1977, it is very desirable that the particular revision of the classification used in recording disorders of mucosa, teeth, and bone and other conditions should be specified. It is suggested that copies of the ICD-DA should be provided to examiners for reference purposes.

and desire it. In both cases the response will depend partly on technical considerations, partly on economic conditions, and partly on priorities given to other economic, health, social, and personal needs. Both WHO and the FDI are supporting the search for a simple and satisfactory system of assessing the need for orthodontic treatment.

Pending the development of generally acceptable system for assessing dentofacial anomalies it is recommended that a modification of the methods proposed by Grainger (*8*), Foster & Day (*9*), and Helm et al. (*10*) should be used.

A dentofacial anomaly is recorded as present if, in the judgement of the examiner, one or more of the following criteria is met.

(1) It has a significant and unacceptable effect on facial appearance.

(2) It causes a significant reduction in masticatory function or results in significant impairment of speech.

(3) There is a gross defect such as cleft lip, cleft palate, or pathological or surgical injury that unquestionably has high priority for treatment.

(4) It constitutes an occlusion predisposing to tissue destruction in the form of periodontal disease or caries.

Anomalies meeting any of these criteria are recorded in box 27 (absent, 0; present, 1). Box 28 is provided in order that individual investigators may define different criteria for dentofacial anomalies in accordance with local social, economic, or health care policy. If this box is used the criteria and coding system must be noted on the survey summary sheets (pp. 53 and 54).

Full-denture Status

Since there are no widely used indices for recording the need for various types of dental prosthesis, only information about the wearing of full dentures is recorded for the basic oral health assessment. Subjects who are edentulous in one or both jaws should be classified as follows:

Not wearing dentures	0
Wearing upper dentures	1
Wearing lower dentures	2
Wearing upper and lower dentures	3

The appropriate code should be entered in box 29.

Periodontal Status

Method of assessment

In applying the scoring methods for soft deposits, calculus, intense gingivitis, and advanced periodontal involvement the mouth is divided into six segments: anterior, from canine to canine, and left and right posterior, from first premolar or first primary molar to the last tooth in the arch, for mandible and maxilla. Each assessment should be made independently, that is, soft deposits should all be noted before calculus is recorded, and all recordings of calculus should be made before those of intense gingivitis or advanced periodontal involvement. This procedure is recommended to ensure that the presence of one of these conditions does not influence decisions on the presence of the other conditions. The presence or absence of each of these four conditions should first be recorded for one maxillary posterior segment, then for the maxillary anterior segment, and finally for the other maxillary posterior segment. The same sequence should be followed for the mandible.

The lingual and vestibular aspect of each segment should be inspected for each assessment. All assessments in a particular segment should cease when a periodontal condition is detected on any aspect of any tooth in that segment.

Criteria for assessment and coding

A. *Soft deposits*

The only instrument to be used is a mouth mirror. If soft deposits are clearly visible to the unaided eye at the gingival margin of one or more teeth within a segment, score "1" for that segment. No attempt should be made to dry the teeth to make soft deposits more readily apparent. If no soft deposit is detected visually within a segment, score "0" for that segment (boxes 30, 31, and 32 for upper teeth and boxes 33, 34, and 35 for lower teeth).

B. *Calculus*

Score "1" for a segment when calculus is obviously present in contact with the gingival margin of one or more teeth in the segment (boxes 36, 37, and 38 for upper teeth and boxes 39, 40, and 41 for lower teeth). Any obvious deposit suspected of being calculus, as determined by direct

inspection or with the aid of a mouth mirror, should be tested with a periodontal probe to confirm that it is in fact calcified, and a score of "1" is then recorded. If the deposit is not calcified score "0".

C. *Intense gingivitis*

The presence of intense or acute gingivitis is recorded (score "1") for segments in which one or more areas of the papillary or marginal gingivae surrounding fully erupted teeth show marked changes in colour, or if firm digital palpation causes bleeding. Intense gingivitis that has extended beyond the papillae into the area of the attached gingivae, indicated by loss of stippling and tone, is included in this category. A change in colour should be determined in relation to the colour of adjacent gingival tissue that is not inflamed. If the intensity of the marginal or papillary inflammation is such that the examiner believes that digital palpation will undoubtedly cause bleeding the gingival tissue should not be palpated. However, if doubt exists about the intensity of gingival inflammation, gingival tissue should be firmly palpated. If there is bleeding on digital palpation, score "1" in boxes 42, 43, and 44 for upper teeth and in boxes 45, 46, and 47 for lower teeth. Score "0" for a segment when:

— there is no conspicuous change in colour,

— there are only minor deviations in gingival colour,

— there are only minor alterations in gingival form,

— there is no bleeding after digital palpation.

D. *Advanced periodontal involvement*

Advanced periodontal involvement is the term used to describe periodontal disease at the stage where the pathological process has definitely extended to involve the periodontal membrane and alveolar bone. For the purposes of an oral health survey the major diagnostic signs are the presence of *either* (*a*) definite tooth mobility *or* (*b*) a periodontal pocket greater than 3 mm in depth *accompanied* by signs of one or more of the following conditions:

(1) *intense gingivitis* (see above for diagnosis);

(2) *marked change in gingival contour*—noted as present when a fibrous change, indicative of chronic gingivitis, is so extensive that adequate tooth cleansing is difficult or impossible or the examiner suspects the presence of a periodontal pocket;

(3) *suppuration*—presence of pus, etc., determined by firm digital palpation of the gingival tissues;

(4) *advanced gingival recession with exposure of cementum*—noted as present when the cementum of the root is exposed.

In making the assessment the following steps are taken if the visual appearance suggests the presence of advanced periodontal involvement.

Step 1. Test for definite tooth mobility with the thumb and index finger, pressing firmly on the crown of the suspected tooth in vestibular, lingual, and apical directions. Mobility is noted as present when definite movement of the tooth is clearly seen. If mobility as described is found score "1" immediately in the box corresponding to the segment in which the affected tooth is found (boxes 48, 49, and 50 for upper teeth and boxes 51, 52, and 53 for lower teeth). It is not necessary to use a periodontal probe in such cases.

Step 2. If obvious mobility is not present but there are signs of one or more of the conditions listed above under (*b*) a periodontal probe, graduated or having a 3-mm disc, is used to confirm the presence or absence of a *periodontal pocket*. The probe is not used unless one or more of the above signs is present and its use is confined to the area where the examiner believes the deepest pocket exists. Insert the periodontal probe vertically into the gingival crevice of the affected tooth and gently move the tip or disc down the tooth side of the pocket until the base of the pocket is felt. If subgingival calculus is present the probe should be moved gently round the obstruction. Measurements may be made on any of the surfaces of the affected tooth. Multiple probings are discouraged and all measurements within a segment should cease as soon as a pocket greater than 3 mm in depth is found. In that case score "1" in the appropriate box (boxes 48, 49 and 50 for upper teeth and 51, 52 and 53 for lower teeth). If findings are negative in both steps 1 and 2 score "0" in corresponding boxes.

Definition of criteria that can be clearly understood by all examiners irrespective of training and experience has proved difficult. Extensive field testing of the criteria described in the first edition of this manual (*7*) established that they were insufficiently precise to ensure an acceptable degree of comparability. Modifications proposed in the first draft of this second edition were field tested in Malaysia (*11*) by 22 participants from 16 countries attending the First WHO Regional Course in Public Health Dentistry. The results obtained provided a basis for redefinition of the criteria. The essential requirements are that, in any system for recording this important disease syndrome, diagnostic variations in individual examiners and between examiners must be maintained within acceptable limits and that findings should be suitable for use in the planning of public health programmes. Inevitably, these requirements can be met only by accepting

certains compromises and restricting the diagnostic signs to those that can be determined simply without stress for the subjects and that can be recognized easily and interpreted uniformly by examiners with varying levels of training and experience.

Dental Caries

Method of assessment

The examination for dental caries should be conducted with a plane mouth mirror and a sharp, sickle-shaped explorer. Radiography is not recommended because of the impracticability of using the equipment in all situations. It should be realized, however, that the need for restorative care will be underestimated on account of the lack of radiographic information.

Examiners should make a systematic approach to the examination for dental caries, proceeding in an orderly manner from one tooth or tooth space to the adjacent tooth or tooth space. A tooth should be considered present in the mouth when any part of it is visible or can be touched with the tip of the explorer without unduly displacing soft tissues. If a permanent and a primary tooth occupy the same tooth space, the status of the permanent tooth only should be recorded.

For many surveys, an assessment of dental caries will be desired for the entire dentition, in which case all teeth should be examined. However, since dental caries is largely a bilateral phenomenon reasonably accurate measurements of an individual's dental caries status can be made by recording observations for one-half of the upper arch and one-half of the lower arch (*12–17*). When half-mouth examinations are scheduled, alternate sides of the mouth should be examined to provide information on the distribution of dental caries by quadrant.

If the half-mouth method is chosen, a coin can be thrown to decide whether the first subject in a survey is examined in the upper left and lower right quadrants or upper right and lower left quadrants. Successive subjects are then examined for dental caries in alternate quadrants. Thus, if the examiner starts with the upper right and lower left quadrants of the first subject, he should examine the upper left and lower right quadrants of the second patient, the upper right and lower left quadrants of the third, and so on. Once established, this alternation should be strictly followed.

Coding

A numerical coding system is used for recording the status of permanent teeth and an alphabetical coding system for primary teeth: boxes numbered 13 to 28 are used for upper teeth and boxes 45 to 60 for lower teeth.[a] Note that boxes pertaining to premolars, or primary molars, cuspids, and incisors are used for both primary and permanent teeth. A distinction is made solely by the use of alphabetical or numerical codings. *An entry must be made in every box on the chart.* Codes for dental caries status of primary and permanent teeth are as follows.

Condition	*Primary tooth code*	*Permanent tooth code*
Sound tooth	A	0
Decayed tooth	B	1
Filled tooth (no other decay)	C	2
Filled tooth (with primary decay)	D	3
Filled tooth (with secondary decay)	E	4
Primary tooth prematurely missing owing to caries (under 9 years only)	M	—
Permanent tooth missing owing to caries (under 30 years only)	—	5
Permanent tooth missing owing to reasons other than caries (under 30 years only)	—	6
Permanent tooth missing for any reason (30 years and older)	—	7
Unerupted tooth	—	8
Excluded tooth	X	9

Criteria for diagnosis and coding

(i) *Sound tooth (A or 0).* A tooth is recorded as sound if it shows no evidence of treated or untreated clinical caries.

(ii) *Decayed tooth (B or 1).* Caries is recorded as present when a lesion in a pit or fissure or on a free smooth tooth surface has a detectably softened floor, undermined enamel, or a softened wall, or the tooth has a temporary filling. On approximal surfaces the explorer point must enter a lesion with certainty. Where any doubt exists caries should not be

[a] In order to simplify computer processing, the numbering of boxes for dental caries status on the basic assessment form has been selected to correspond to that on the combined assessment form. Thus, boxes 13–28 and 45–60 on card 2 (p. 31) are used for recording dental caries status on the basic form.

recorded as present. The stages of caries that precede cavitation as well as other conditions similar to the early stages of caries are deliberately excluded because they cannot be diagnosed positively and reliably. Defects not to be counted as caries *in the absence of other positive criteria* are:

— white or chalky spots;

— discoloured or rough spots;

— stained pits or fissures in the enamel that catch the explorer but do not have a detectably softened floor, undermined enamel, or softening of the walls.

(iii) *Filled tooth with no decay (C or 2).* Teeth are considered filled without decay whenever one or more permanent restorations are present and there is no secondary (recurrent) caries or other area of the tooth with primary caries. A tooth with a crown placed because of previous decay is recorded in this category. A tooth that is crowned for reasons other than decay, e.g., trauma or as a bridge abutment, is recorded as EXCLUDED, and coded "X" or "9".

(iv) *Filled tooth with primary decay (D or 3).* A tooth is scored as filled with primary decay when it contains one or more permanent restorations and also one or more areas that are decayed but have no obvious physical association with the restoration(s). A tooth with a *temporary filling* should be coded as "decayed B or 1".

(v) *Filled tooth with secondary decay (E or 4).* A tooth is scored as filled with secondary decay when it contains one or more permanent restorations and there is secondary decay (in physical contact with the restoration(s)). If a tooth is filled and contains both primary and secondary decay it should be recorded in this category (i.e., E or 4).

(vi) *Primary tooth missing owing to caries (under 9 years only) (M).* This score is used only for primary teeth missing at an age when normal exfoliation would not be a sufficient explanation for absence.

(vii) *Permanent tooth missing owing to caries (under 30 years) (5).* This score is used only for permanent teeth and for persons under 30 years of age. Inasmuch as very few teeth are extracted because of periodontal diseases in persons under 30 years of age, all extracted teeth (except those included under category 6) in persons up to the age of 30 years should be recorded as having been extracted because of caries. For convenience in recording, full extractions in either dental arch in persons under 30 years of age may be indicated by scoring "5" in boxes 13 and 28 and/or boxes 45 and 60, as appropriate, and linking the respective pairs of numbers with straight lines. No other entry is necessary in the other boxes

of the row or rows. The data will be tabulated to indicate that all teeth in the arch with linked scores of "5" have been extracted.

One problem that may be encountered, particularly in some age groups, is to distinguish between unerupted teeth (code 8) and teeth extracted because of caries. Basic knowledge of tooth eruption patterns, the status of the corresponding contralateral tooth, the appearance of the alveolar ridge in the area of the tooth space in question, and the caries status of other teeth in the mouth may provide helpful clues in making a differential diagnosis between unerupted and extracted teeth. It is emphasized again that code 5 should not be used for extracted or exfoliated primary teeth or for adults aged 30 years or more.

(viii) *Permanent tooth missing for reasons other than caries (under 30 years) (6).* This score is used for permanent teeth judged to be absent congenitally or extracted for orthodontic reasons.

(ix) *Permanent tooth missing for any reason (30 years of age and older) (7).* This score also is used only for permanent teeth. Since it becomes extremely difficult in older persons to ascertain whether permanent teeth have been extracted because of dental caries or on account of periodontal diseases, all extracted teeth in persons aged 30 years or more are arbitrarily scored "7". Again, for convenience, a single "7" should be placed in boxes 13 and 28 and/or 45 and 60, as appropriate, and the respective pairs of numbers linked with straight lines to indicate edentulous arches.

(x) *Unerupted tooth (8).* This classification is restricted to permanent teeth and used only for a tooth space with an unerupted permanent tooth, but no primary tooth, present. Teeth scored as unerupted are, of course, excluded from all calculations concerning dental caries. For differential diagnosis between extracted and unerupted teeth see section (vii) above, permanent tooth missing owing to caries.

(xi) *Excluded tooth (X or 9).* A permanent or primary tooth should be excluded from calculations concerning dental caries if it has been restored for reasons other than caries, such as trauma, cosmetic purposes, or as an abutment for a bridge.

Reporting the caries data

Alphabetical or numerical entries in the dental caries boxes can be summarized by computer. When a half-mouth examination is used the total for each code is doubled in order to arrive at an estimated value for

each subject. Primary and permanent dentitions should be summarized separately, reporting the percentage of persons with caries, and the average number of dmf or DMF teeth per person, with separate figures for d or D, f or F, and m or M teeth per person. It is also advisable to give separate figures for filled and primary decay and filled and secondary decay, bearing in mind that the d or D component of the DMF index includes these two categories.

The M component of average DMF scores up to age 30 represents teeth extracted because of dental caries. For age 30 and over the missing component represents teeth extracted because of all causes, and might be termed more appropriately "tooth mortality score".

3. COMBINED ORAL HEALTH AND TREATMENT ASSESSMENT

The Combined Oral Health and Treatment Assessment Form

Methods for measuring oral health status in the combined oral health and treatment assessment form are essentially the same as those for basic assessment. Additionally, the assessment form (pp. 42 and 43) contains a simple measure of utilization of existing services, more detailed measurements of the consequences of tooth loss with respect to the need for full and partial dentures, and a section for recording conditions that need immediate attention. However, an additional feature of the combined assessment of major importance is that it will provide data for each oral health status section, enabling health administrators to obtain more comprehensive estimates for preventive, curative, and restorative action and for manpower requirements than are possible from oral health status measurements alone.

Countries vary greatly in the capacity of the dental profession to meet demands for oral health care and in professional attitudes and treatment techniques. For this reason there may be wide variations in the findings of examiners from different areas on treatment needs. Nevertheless, data on treatment needs are of great value at local or national levels because they provide a reliable basis for estimating manpower requirements and costs of an oral health programme under prevailing or anticipated local conditions.

The examination routine is described here following the order in which sections appear on the form reproduced on pages 42 and 43, except that the section "conditions needing immediate attention" is treated last.

WHO COMBINED ORAL HEALTH AND TREATMENT ASSESSMENT FORM Sheet 1

Note 1. No codes to be changed 2 Unused sections to be cancelled by diagonal lines

(1) J 2 (5) Study Number Date 19 (6) (7) Registration Number (8) (11) Examination Number (for (12) duplicates)

PERSONAL AND DEMOGRAPHIC INFORMATION

Sex M = 1 F = 2 (13)

Name family other

Age in years (14) (15)

Geographic location (18) (19)

Ethnic group (16)

Examiner (20)

Occupation (17)

SERVICE UTILIZATION

Q. 1 Did you obtain dental care in the last 12 months?

NO = 0 (21)
YES = 1

CODE CATEGORIES FROM RESPONSE (1 to 6, 9)
See list in criteria (p. 1)

If YES Q. 1(a) For what reason? (22)

CODE CATEGORIES FROM RESPONSE (1 to 5)
See list in criteria (p. 1)

Q. 1(b) Who treated you? (23)

If NO Q. 1(c) Why not? (24)

CODE CATEGORIES FROM RESPONSE (1 to 9)
See list in criteria (p. 2)

Q. 2 Is anything wrong with your teeth, gums or mouth now?

(25)

CODE CATEGORIES FROM RESPONSE (0 to 4, 9)
See list in criteria (p. 2)

Q. 2(a) Do you want any dental advice or treatment?

NO = 0 (26)
YES = 1

If you do Q. 2(b) What sort of advice or treatment do you want?

(27)

CODE CATEGORIES FROM RESPONSE (0 to 9)
See list in criteria (p. 2)

DISORDERS OF MUCOSA TEETH AND BONE AND OTHER CONDITIONS

ABSENT = 0, PRESENT, NO TREATMENT RECOMMENDED = 1, PRESENT, TREATMENT RECOMMENDED = 2

ORAL MUCOSAL DISEASE (28)
Specify Disease
Treatment

DEFECT OF TEETH (29)
Specify Defect
Treatment

DISORDERS INVOLVING BONE
Specify (30)
Disease
Treatment

OTHER CONDITIONS
Titles to be entered as needed, from results of pilot study

(31)

(32)

(33)

PROSTHETIC STATUS

NO DENTURE = 0, DENTURE WEARING = 1
DENTURE NOT WEARING 2

UPPER JAW LOWER JAW

(34) full (35) partial (36) full (37) partial

DENTURE REQUIREMENTS

NIL = 0, NEW DENTURE REQUIRED = 1
REPAIR, RELINE OR REMODEL 2

LOWER JAW UPPER JAW

(38) full (39) partial (40) full (41) partial

WHO 5297 ORH (6/76) 40000

CARD No. 3

WHO COMBINED ORAL HEALTH AND TREATMENT ASSESSMENT FORM Sheet 2

Note: 1. No codes to be changed. 2. Unused sections to be cancelled by diagonal lines

(1) J 2 [ ][ ][ ] (5) Study Number

Date . . . . . 19 (6) [ ][ ]

(7) Registration Number (8) [ ][ ][ ][ ] (11)

Examination Number (for duplicates) (12) [ ]

PERIODONTAL STATUS

Absent = 0 Present = 1

SOFT DEPOSITS	max.	(42)	[ ][ ][ ]	(44)
	mand.	(45)	[ ][ ][ ]	(47)
CALCULUS	max.	(48)	[ ][ ][ ]	(50)
	mand.	(51)	[ ][ ][ ]	(53)
INTENSE GINGIVITIS	max.	(54)	[ ][ ][ ]	(56)
	mand.	(57)	[ ][ ][ ]	(59)
ADVANCED PERIODONTAL INVOLVEMENT	max.	(60)	[ ][ ][ ]	(62)
	mand.	(63)	[ ][ ][ ]	(65)

NB. Central segments include cuspids and incisors left and right segments include molars and premolars

PERIODONTAL TREATMENT REQUIREMENTS

(66) [ ]

NONE	0
Oral Hygiene Instruction	1
Prophylaxis and OHI	2
Periodontal therapy (no extraction)	3
Treatment with 1 or more extraction	4
Full extraction	5

DENTOFACIAL ANOMALIES

WHO Criteria condition (specify) . . . . . (67) [ ]

treatment . . . . . (68) [ ]

Other criteria (to be specified) condition (specify) . . . . . (69) [ ]

treatment . . . . . (70) [ ]

CONDITIONS NEEDING IMMEDIATE ATTENTION

ABSENT = 0 PRESENT = 1

RELIEF OF EXISTING PAIN OR INFECTION (71) [ ]

TREATMENT FOR LESIONS LIKELY TO CAUSE PAIN OR INFECTION IN THE IMMEDIATE FUTURE (72) [ ]

TREATMENT OF PULPALLY INVOLVED TEETH (73) [ ]

OTHER (SPECIFY) . . . . . (74) [ ]

. . . . . .

CARD NO. (80) [3]

DENTAL CARIES STATUS AND TREATMENT OF TEETH

		R																L		
		18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28			
					55	54	53	52	51	61	62	63	64	65						
CARIES	(13)																	(28)	CARIES	
TREATMENT	(29)																	(44)	TREATMENT	
		48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38			
					85	84	83	82	81	71	72	73	74	75						
CARIES	(45)																	(60)	CARIES	
TREATMENT	(61)																	(76)	TREATMENT	

DENTAL CARIES	PRIMARY	PERM.
SOUND	A	0
DECAYED	B	1
FILLED & CARIES FREE	C	2
FILLED WITH PRIMARY DECAY	D	3
FILLED WITH SECONDARY DECAY	E	4
PRIMARY TEETH MISSING DUE CARIES < 9 yrs	M	–
PERMANENT TEETH MISSING DUE CARIES (UNDER 30 YEARS ONLY)	–	5
PERMANENT TEETH MISSING ANY REASON OTHER THAN CARIES (UNDER 30 YEARS ONLY)	–	6
PERMANENT TEETH MISSING ANY REASON (30 YEARS & OLDER)	–	7
UNERUPTED TOOTH	–	8
EXCLUDED TOOTH	X	9

TREATMENT	
NONE	0
RESTORATIONS	
1 surface	1
2 surface	2
3 surface	3
> 3 surface or crown	4
EXTRACTION FOR	
caries	5
periodontal disease	6
dentures	7
other reason	8
OTHER (specify)	9

CARD No (80) [4]

Service utilization

Question 1 in this section attempts to measure a subject's actual use of oral health care facilities, including reasons for use or non-use and types of personnel visited. Question 2 tries to assess the subject's understanding of his own need and desire for care. From the responses to these questions a planner can estimate what proportion of the population regularly uses the existing oral health services, would use these services if available, or will seek only emergency care whatever levels of service are provided and/or available.

Subjects should be questioned by the recorder or by a third person such as a schoolteacher before the oral examination is carried out. It is important to put the questions directly, and expected responses must not be suggested to the subject. The examiner should instruct the questioner (the recorder or a schoolteacher) on the coding of responses. Each question should be considered in relation to local conditions before the survey begins and all necessary variations in the form of questions and responses should be included on the survey criteria leaflet (see p. 24, footnote *a*) in the space provided. The examiner should always be present during the interviewing so that difficulties with the coding of particular responses can be resolved immediately. As it is not possible to include all responses on the survey form (p. 42) details for completing this section of the combined assessment are given below.

Interview technique

Question 1: "Did you obtain dental care in the last 12 months?"

(Response (No = 0, Yes = 1) to be coded in box 21, card 3.)

If response to question 1 is "Yes", pose questions 1(*a*) and 1(*b*). If response is "No", put question 1(*c*).

Question 1(*a*): "For what reason?" To this question the interviewer will add, "If it was a series of visits give the reason for beginning the series. We want to know why you went to get care, not what care you got during the visit."

The response to this question should be coded according to the following list, but the list should *not* be read out to the subject.

Response	*Code*
To get teeth cleaned	1
Something was hurting	2
To get something fixed (e.g., filling, repair, etc.)	3
Went for a check-up	4
Was sent an appointment for check-up	5
Other (specify)	6
Don't know	9

(Response code to be written in box 22, card 3.)

Question 1(*b*): "Who treated you?"

The response to this question should be coded according to the following list, but the list should *not* be read out to the subject.

Response	*Code*
Dentist	1
Dental nurse/therapist	2
Hygienist	3
Medical practitioner/auxiliary	4
Other (specify)	5

(Response code to be written in box 23, card 3.)

Question 1(*c*): "Why not?"

The response to this question should be coded according to the following list, but the list should *not* be read out to the subject.

Response	*Code*
Nothing wrong, no reason to go	1
Afraid of dentists, don't like dentists	2
Can't afford it, costs too much	3
Didn't want to spend money on dental care	4
Was too busy *or* didn't get around to it	5
No service available	6
Have no teeth *or* have false teeth	7
Other reason (specify)	8
Don't know	9

(Response code to be written in box 24, card 3.)

Question 2: "Is anything wrong with your teeth, gums, or mouth now?"

The response to this question should be coded according to the following list, but the list should *not* be read out to the subject.

Response	*Code*
No	0
Yes, teeth only	1
Yes, gums only	2
Yes, teeth and gums	3
Yes, other (specify)	4
Don't know	9

(Response code to be written in box 25, card 3.)

Question 2(*a*): "Do you want any dental advice or treatment?"

(Response (No = 0, Yes = 1) to be coded in box 26, card 3.)

If response to question 2(*a*) is "Yes" put question 2(*b*).

Question 2(*b*): "What sort of advice or treatment do you want?"

The response to this question should be coded according to the following list, but the list should *not* be read out to the subject.

Response	*Code*
Preventive	0
Examination or cleaning	1
Scaling or periodontal care	2
Fillings, crowns, or bridges	3
Extraction or other surgery	4
Dentures	5
Orthodontic care	6
More than one of the above categories	7
Other (specify)	8
Don't know	9

(Response code to be written in box 27, card 3.)

Disorders of Mucosa, Teeth, and Bone and Other Conditions

The description of this part of the examination appears in Chapter 2, page 30, under the same heading. However, on the basic oral assessment form code 1 simply denotes the presence of a condition; in the combined assessment "1" denotes "condition present, no treatment recommended" (boxes 28, 29, and 30, card 3). A score of "2" should be recorded where treatment is recommended, and the type of treatment specified in the space provided. For example, if oral cancer is suspected the patient should be referred immediately to a hospital for detailed examination and biopsy; however, a small papilloma on the tongue may require no treatment. If an incisor is fractured and there is exposure of the pulp it may be necessary to refer the patient for emergency treatment, whereas a fractured incisor without exposure of the pulp may require no treatment.

Similarly, for other conditions (boxes 31, 32, and 33, card 3), described on pages 30 and 32, it is necessary to reserve a code for treatment recommended, and in such cases to record in writing what action should be taken to eliminate or ameliorate the effects of the condition on oral health. (All codes used in this section must be noted on the survey summary sheet, pp. 53 and 54.) For example, if excessively vigorous toothbrushing has caused abrasion of a subject's teeth, he will require health education (toothbrushing instruction). If severe opacities of tooth enamel are prevalent the local water supply should be analysed and if excessively high fluoride levels are present recommendations made to change to a low-fluoride

source. If a patient has oral signs of severe systemic disease, e.g., a possible blood dyscrasia, he should be referred immediately to a physician or hospital.

Prosthetic Status and Denture Requirements

The following criteria and codes for prosthetic status and the need for dentures apply to full, partial, upper, and lower dentures.

Prosthetic status (boxes 34–37, card 3)

Code 0 (= *no denture*) is recorded when, on clinical examination, no denture is present or where the subject states that he does not possess, and has never possessed, a denture.

Code 1 (= *denture, wearing*) is recorded when a denture is worn at the time of the examination.

Code 2 (= *denture, not wearing*) is recorded when a subject claims to possess, or to have possessed, a denture, but it is not being worn at the time of the examination.

Denture requirements (boxes 38–41, card 3)

Code 0 (= *no denture required*) is recorded when no denture is required because the subject has either a complete or a satisfactorily intact dentition, a satisfactory denture is being worn, or the examiner believes the subject would be unable to wear a denture because of his age or a physical or mental handicap.

Code 1 (= *new denture required*) is recorded when a subject is edentulous or when his remaining dentition is sufficiently incomplete *and* he has not already been provided with a denture, or when the denture he possesses is unsatisfactory in terms of function, design, fit, occlusion, or appearance, or if it is damaging or potentially damaging to tissue. This code is frequently recorded if a score of "2" has been placed in the prosthetic status section unless the existing denture can be repaired, relined, or remodelled (see below).

Code 2 (= *repair, reline, or remodel*) is recorded when a subject presents for examination with a broken but reparable denture, with an ill-fitting denture that can be relined or remodelled, or if the subject claims he has a denture, which is not being worn, that is satisfactory except for the need for minor repair, relining, or remodelling.

Periodontal Status

The method of assessment and criteria for periodontal status are the same as those described in Chapter 2 (pp. 34–37) but on the combined form the boxes for recording periodontal status are 42–65, card 3.

Assessment of periodontal treatment requirements

Since the periodontal status of each subject is determined by a rapid visual examination it is possible to define the preventive or curative action required only in general terms. The aim of categorizing treatment is to differentiate between uncomplicated therapy (categories 1 and 2), complex therapy (categories 3 and 4), and terminal therapy, i.e., extraction (category 5).

The criteria for the various types of preventive or therapeutic action to be coded in box 66, card 3 are as follows.

Code 0 = *No treatment necessary.* There are no obvious signs of soft deposits, calculus, intense gingivitis, or advanced periodontal involvement. All entries in the boxes on status (42–65) are scored "0".

Code 1 = *Oral hygiene instruction.*[a] Soft deposits are present in one or more segments but there are no obvious signs of either intense gingivitis or advanced periodontal involvement.

Code 2 = *Prophylaxis and oral hygiene instruction.* Soft deposits and calculus are present. Intense gingivitis may be recorded in one or more segments but there are no obvious signs of advanced periodontal involvement.

Code 3 = *Periodontal therapy without the extraction of any teeth for periodontal reasons.* There are obvious signs of advanced periodontal involvement in one or more segments but the teeth are functionally satisfactory.

Code 4 = *Treatment which includes the extraction of one or more, but not all, teeth for periodontal reasons.* There are obvious signs of advanced periodontal involvement in one or more segments and in one or more teeth the disease has proceeded to the terminal stage where these teeth are so loose and/or non-functional that conservative therapy is neither warranted nor possible. In such cases the teeth to be extracted should also be recorded as "6" in the appropriate treatment box for individual teeth (boxes 29–44 and 61–76, card 4).

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[a] Oral hygiene instruction is important for everyone but this category is intended to provide for those needing special instruction.

Code 5 = *Full extraction.* Advanced periodontal involvement has proceeded to a stage where all teeth (or all but a few teeth) are so loose and/or non-functional that conservative therapy is neither warranted nor possible. In such cases "5" is placed in the periodontal treatment box (box 66, card 3) and "6" is recorded for all teeth to be extracted in the appropriate treatment boxes for individual teeth (boxes 29–44 and 61–76, card 4).

On pages 36–37 reasons are given for accepting compromises in criteria for the assessment of periodontal disease. Similar reasons apply in the assessment of need for periodontal treatment. There will be individual cases in which the criteria are not fully satisfactory for defining the treatment required. It should be remembered, however, that the unit of study in an oral health survey is a group of people. Examiners should not waste time worrying about individual exceptional cases but should exercise their clinical judgement in determining which type of treatment best fits the findings. For example, an adult may show signs of obvious tooth mobility in his few remaining teeth and advanced periodontal involvement is scored in the appropriate segment or segments, but if the teeth are still functional and there is no gross infection they may be left to serve a useful purpose for some time. Thus the appropriate code for treatment may be 0, 1, or 2 instead of 3, 4, or 5. If different types of treatment are required in different parts of the mouth only the most advanced or radical form of treatment is scored.

Dentofacial Anomalies

Guidelines for assessing dentofacial anomalies are described in Chapter 2, pages 32–33. If the anomaly fulfills one or more of the prerequisites listed there a score of "1" is recorded (box 67, card 3), if not, score "0".

For such scores, the type of treatment required is recorded in box 68, card 3 according to the following list of codes.

Code 0 = *No treatment required*

Code 1 = *Extraction of teeth only, no active tooth movement required.*

Code 2 = *Removable appliance treatment—active tooth movement required, with or without extraction of teeth.* Treatment is concerned with correction of local abnormalities, generally in patients with class I malocclusions or functional class II malocclusions. Treatment of moderate to

severe skeletal class II or class III malocclusions or soft tissue conditions should not be included in this section.

Code 3 = *Fixed appliance treatment*; this should include all malocclusions with moderate to severe skeletal abnormalities (class II or III) or soft tissue abnormalities or where the position of individual teeth requires root straightening even in class I cases.

Code 4 = *Surgical or other treatment of gross defects such as cleft lip or palate or pathological or surgical injury.*

Boxes 69 and 70, card 3, are provided so that the investigator may define different criteria (compare with p. 33) for both dentofacial anomalies and treatment requirements. These boxes should only be used if the WHO criteria are *not* satisfactory for the population under investigation. Criteria and codes must be noted on the survey summary sheet (pp. 53 and 54).

Dental Caries and Treatment of Teeth

Dental caries status

The method of assessment and the criteria are the same as those described for the basic assessment (Chapter 2, pp. 37–41) except that for combined oral health status and treatment assessment, the half-mouth method of examining is *not* recommended; the entire dentition (all tooth spaces) should be examined and the findings recorded.

The numerical coding system and explanatory note for the basic assessment (see Chapter 2, pp. 37 and 38) apply equally to the combined assessment. Boxes 13–28 and 45–60, card 4 are used for recording caries status.

Treatment requirements of teeth

Immediately after the caries status of a tooth is recorded, i.e., before proceeding to the next tooth space, the type of treatment required, if any, should be recorded (boxes 29–44 and 61–76, card 4). If no treatment is required, score "0" in the appropriate treatment box. If this is not done, it will be impossible to determine at a later stage when the data are processed whether no treatment was necessary or whether the examiner or recorder omitted to make an appropriate entry.

The codes and criteria to be used are as follows.

Code 0 = *None.* This code is recorded if a tooth is sound, or if it is decided that a tooth cannot or should not receive restorative treatment (filling or crown). Moreover, this code is used only if the tooth is not indicated for extraction on account of periodontal disease, prosthetic or orthodontic considerations, traumatic injury, or for any other reason.

Codes 1, 2, 3, or 4 = *Restorations and crowns.* Depending on how many surfaces will be involved for restoration, one of these codes should be used to designate the treatment required to remove primary or secondary caries, to repair damage due to trauma, or to replace unsatisfactory fillings. Discoloration of a tooth resulting from trauma, a pulpal condition, or a developmental defect may also be reasons for a restoration. Replacement of a filling or crown should be recorded in the absence of caries when there are one or more signs of the following.

(*a*) A deficient margin to an existing restoration that is likely to permit leakage into dentine. The decision as to whether or not a margin is deficient should be based on the examiner's clinical judgement, on evidence gained by the insertion of an explorer at the margin, or on the presence of severe staining of the tooth structure.

(*b*) An overhanging margin of an existing restoration of a dimension that causes obvious local irritation to the gingivae and cannot be removed by recontouring the restoration.

(*c*) Fracture of an existing restoration that either causes it to be loose or permits leakage into dentine.

Code 5 = *Extraction for caries.* A tooth is recorded as "indicated for extraction because of caries", depending on the treatment possibilities available, when:

(*a*) caries has so destroyed the crown that it cannot be restored;

(*b*) caries has progressed to an extent that there is an obvious and open exposure of the pulp; or

(*c*) only the roots remain.

A single tooth may be indicated for extraction for more than one reason—for caries and periodontal disease, for example. In such cases the examiner should attempt to decide the major reason for extraction and record that reason only.

Code 6 = *Extraction for periodontal disease.* A tooth is recorded as indicated for extraction because of periodontal disease when the disease

has progressed so far that the tooth is loose or functionless *and,* in the clinical judgement of the examiner, cannot be restored to a firm and functional state by periodontal therapy.

For subjects classified as code "5" (full extraction, see p. 49) in the assessment for periodontal treatment, all teeth present should be scored as "6" in this section. If all of the upper teeth are to be extracted because of periodontal disease it is sufficient to place a "6" in boxes 29 and 44 and link these boxes with a horizontal line. Likewise, if all lower teeth are to be extracted because of periodontal disease it is sufficient to place a "6" in boxes 61 and 76 and link the boxes with a horizontal line.

For all other subjects a score of "6" is entered only in the boxes corresponding to teeth requiring to be extracted because of periodontal disease.

Code 7 = *Extraction for prosthetic reasons.* A tooth should be recorded as "indicated for extraction for prosthetic reasons" when extraction is not specifically required because of caries or periodontal disease but, rather, because a full denture is planned. Individually, these teeth could be restored or conserved but, because there are too few for proper function, extraction to make way for a prosthesis is the only possible treatment.

Code 8 = *Extraction for other reasons.* A tooth is recorded as "indicated for extraction for other reasons" when extraction is required for orthodontic or cosmetic reasons, on account of a developmental defect, or because of impaction.

Code 9 = *Other.* This category is used to indicate any other treatment not specifically covered by codes 1–8. For example, removal of gross overhangs, replacement of pontics of bridges, splints for loose teeth, and removal of occlusal interferences on restorations might be included in this category. Note, however, that treatment of pulpally involved teeth is included in the next section.

Conditions Needing Immediate Attention

The items listed on the combined assessment form are self-explanatory; the examiner will use his clinical judgement to decide whether emergency treatment is required. "Immediate attention" is taken to mean that, in the judgement of the examiner, pain, infection, or serious illness will result unless treatment is provided within the period of time specified in

J2 SURVEY SUMMARY - WHO ORAL HEALTH ASSESSMENT

Country: ..... Date: .....

Principal investigator: .....

Address: .....

.....

Registration numbers used: ..... to .....

..... to .....

..... to .....

Age ranges examined: .....

NB: Boxes 16 to 20 apply to both the basic and combined forms

Ethnic group or alternative code (Box 16) If alternative, specify	Geographic location code (boxes 18 & 19)	Examiner code (box 20)
..... 1	 01	 1
..... 2	 02	 2
..... 3	 03	 3
..... 4	 04	 4
..... 5	 05	 5
..... 6	 06	 6
..... 7	 07	 7
..... 8	 08	 8
..... 9	 09	 9
..... 0	 10	 0
	 11	
	etc.	

Occupation or alternative code (Box 17) If alternative, specify

..... 1
..... 2
..... 3
..... 4
..... 5
..... 6
..... 7
..... 8
..... 9
..... 0

J2 SURVEY SUMMARY *(continued)*

Codes for other conditions recorded

Box No. 24 (basic form card 1) / Box No. 31 (combined form card 3)	Code	Box No. 25 (basic form card 1) / Box No. 32 (combined form card 3)	Code	Box No. 26 (basic form card 1) / Box No. 33 (combined form card 3)	Code
.....	1	.....	1	.....	1
.....	2	.....	2	.....	2
.....	3	.....	3	.....	3
.....	4	.....	4	.....	4
.....	5	.....	5	.....	5
.....	6	.....	6	.....	6
.....	7	.....	7	.....	7
.....	8	.....	8	.....	8
.....	9	.....	9	.....	9
.....	0	.....	0	.....	0

Codes and criteria for dentofacial anomalies and treatment requirements

Box No. 28 (basic form card 1) / Box No. 69 (combined form, card 3)	Code	Box No. 70 (combined form, card 3)	Code
.....	1	.....	1
.....	2	.....	2
.....	3	.....	3
.....	4	.....	4
.....	5	.....	5
.....	6	.....	6
.....	7	.....	7
.....	8	.....	8
.....	9	.....	9
.....	0	.....	0

advance by the person in charge of the survey. Depending on the availability of oral health services, this period may vary from a few days to a month. Examples of conditions that require immediate attention for the relief of pain or infection (box 71, card 3) include acute periapical abcess and acute necrotizing ulcerative gingivitis. Examples of lesions likely to cause pain or infection in the immediate future (box 72, card 3) unless prophylactic treatment is instituted include gross caries and chronic alveolar abscesses in children. The need for treatment of pulpally involved teeth (box 73, card 3) should be recorded only when there is obvious evidence of pulp exposure in a tooth that apparently can be satisfactorily restored with a filling or a crown. A probe should never be inserted into the depth of a cavity to confirm the presence of a suspected exposure.

Life-endangering conditions such as precancerous conditions or carcinoma should be included and specified in box 74, card 3.

The items coded in boxes 71–74, card 3 are not mutually exclusive; multiple recordings can be made when more than one condition requiring immediate attention is present. As a general rule, conditions in this section should be recorded only if there is an obvious and immediate need for treatment.

4. POST-SURVEY ACTION AND PREPARATION OF SURVEY REPORTS

Sending Forms for Analysis

When the survey has been completed the principal investigator should ensure that all forms are assembled in numerical order according to registration number to facilitate the checking of forms. It is not necessary to sort the forms by location or age group as this will be done by the computer. If the combined oral health and treatment assessment form is prepared as two separate sheets (as illustrated here), care should be taken to keep both the sheets for each subject together.

When the data are to be analysed locally without assistance from WHO, the principal investigator should organize delivery of the forms to the computer centre with which arrangements have previously been made. If the analysis is to be performed by WHO, the forms should be tied in bundles of about 100 and each bundle should be clearly labelled with the name of the country where the survey was carried out. The survey summary sheets provided by WHO should be completed in duplicate, one copy being retained by the investigator and the other included in the package

of forms being dispatched for processing. Parcels should be packed and fastened securely so that forms are not lost, damaged, or jumbled during transit. Parcels of forms should be addressed to Oral Health, Division of Noncommunicable Diseases, World Health Organization, 1211 Geneva 27, Switzerland.

Provided that notice is given some months in advance of the arrival of data, that all necessary information has been included on the survey summary sheets, and that all data have been coded correctly, the analysis should be completed within 2 months of receipt of the raw data. Where surveys include more than 5000 subjects a somewhat longer period may be required for analysis. In that event investigators will be notified. Presentation of incomplete information, inaccurate coding of observations, and inadequate packaging of completed forms are likely to cause delays.

Preparation of Survey Reports

The United Nations Sub-Commission on Sampling (*18*) and the FDI Commission on Classification and Statistics for Oral Conditions (*19*) have made specific recommendations concerning the preparation of survey reports. In order to facilitate comparisons with other surveys, it is recommended that reports conform as closely as possible with the general principles set out in these publications.

The amount of detail to be included in a report will depend on the requirements of the agency for which the survey is being conducted. If the report is to be written for publication in a scientific journal it will be much briefer than if it is to be published as a monograph. In both cases, however, the report should include some or all of the following information.

Statement of the purposes of the survey

This statement should include a succinct and clear description of the aims of the survey and the expected ways in which the results will be used.

Materials and methods

Under this heading it is customary to include the following.

(1) *A description of the material covered by the survey.* A general description of the geographical region and of the people examined is required.

(2) *The nature of the information collected.* This should be reported

in some detail and should include a description of the types of data and the specific diseases or conditions recorded.

(3) *Methods of collecting data.* A description is required of the methods used to collect data, e.g., by questionnaire, interview, or clinical examination.

(4) *Sampling method.* An explanation should be given of the method of sampling that was used, the size of the sample, the proportion of the population sampled, and the extent to which the sample is considered representative of the study population. The number and description of persons who were selected for the sample but not examined, and any sampling problems encountered should also be reported.

(5) *Personnel and physical arrangements.* It is desirable to give a brief account of the physical arrangements at the examination site, the equipment used, and the organization, previous training, and experience of the personnel employed in collecting, processing, and tabulating the primary data. Arrangements made for standardization and calibration of examiners and for checking the consistency of examiners during the course of the survey should be explained.

(6) *Statistical analysis and computational procedure.* The statistical methods followed in compiling the final summary tables from the raw data should be described briefly or references given; for example, reference can be made to methods used in this manual, where appropriate. If unusual statistical analyses have been made of the results presented in the final summary tables adequate bibliographical references or, in certain cases, descriptions of the analyses, should be included.

(7) *Cost analysis.* Information on survey expenses is of considerable interest. Separate reporting of costs for planning, pilot surveys, calibration trials, field work, supervision, statistical analysis, salaries, and overheads facilitates the critical evaluation of survey methods and provides economic data for health surveys in general.

(8) *Reliability and reproducibility of the results.* It is important to include data on between-examiner and within-examiner variability as revealed by presurvey calibration trials and/or duplicate examinations conducted during the course of the survey. This information gives the planner for the area and the reader of the report an indication of the magnitude of examiner error that may apply to any of the results.

Results

Results may be presented in several ways. If brevity is important the text should contain a written description of the more important results only. Summary tables may be included in the text, or in an annex if they are numerous, or they may even be reproduced separately and made available, on request, to interested readers. Illustrations such as graphs, histograms, bar-charts, pie-charts, or scatter diagrams may be used to illustrate points that are neither easily explained in the text nor easily visualized from tables. A cardinal rule for both figures and tables is that they should be labelled clearly so that they are readily comprehensible without reference to the text.

Discussion and conclusions

The purposes of the discussion are to (1) explain the extent to which the survey met the objectives for which it was designed, (2) highlight results of particular interest, (3) discuss their significance, and (4) suggest further work required either for planning or for elucidating certain findings.

Summary

A brief summary of the report is required that should be of a suitable length for use as an abstract. The objectives of the study and the number of people examined should be stated and a few of the more important results given for caries and periodontal diseases in two or three age groupings: for example, proportion of subjects affected by caries and DMF teeth and proportion with severe gingivitis and advanced periodontal involvement and calculus. Any unusual or unexpected results obtained should also be noted.

REFERENCES

1. WHO Technical Report Series, No. 242, 1962 (*Standardization of reporting of dental diseases and conditions:* report of an Expert Committee on Dental Health).
2. *Application of the International Classification of Diseases to dentistry and stomatology (ICD-DA).* Geneva, World Health Organization, 1973.
3. *Manual of the international statistical classification of diseases, injuries, and causes of death, eighth revision 1965.* Geneva, World Health Organization, 1967.
4. *Principal requirements for controlled clinical trials of caries preventive agents and procedures.* London, International Dental Federation, 1974 (Technical Report No. 1).

5. *A method for measuring occlusal traits.* London, International Dental Federation, 1974 (Technical Report No. 2).
6. *Classification of epidemiologic studies of dental caries and definitions of related terms.* London, International Dental Federation, 1975 (Technical Report No. 3).
7. *Oral health surveys: basic methods.* Geneva, World Health Organization, 1971.
8. GRAINGER, R. M. *Orthodontic treatment priority index.* Washington, DC, National Center for Health Statistics, 1967 (Publication Series 2, No. 25).
9. FOSTER, T. D. & DAY, W. A survey of malocclusion and the need for orthodontic treatment in a Shropshire school population. *British journal of orthodontics,* **1**:73-78 (1975).
10. HELM, S. ET AL. Estimates of orthodontic treatment need in Danish schoolchildren. *Journal of community dentistry and oral epidemiology,* **3**:136-142 (1975).
11. DAVIES, G. N. & BARMES, D. E. An evaluation of proposed revisions to the WHO manual "Oral health surveys - basic methods". *Journal of community dentistry and oral epidemiology,* **4**:55 (1976).
12. DAVIES, G. N. ET AL. The assessment of periodontal disease for public health purposes. *Journal of periodontology,* **9**:62-70 (1974).
13. KNUTSON, J. W. & ARMSTRONG, W. D. The effect of topically applied sodium fluoride on dental caries experience. *Public health reports (Washington),* **58**:1701 (1943).
14. KNUTSON, J. W. & KLEIN, H. Studies on dental caries. Part 4. Tooth mortality in elementary school children. *Public health reports (Washington),* **53**:1021 (1938).
15. PONCOVA, V. & MRKLAS, L. [Caries susceptibility of different types of permanent teeth.] *Československá stomatologie,* **61**:430 (1961) (in Czech).
16. SCOTT, D. B. Study of bilateral incidence of carious lesions. *Journal of dental research,* **23**:105 (1944).
17. WELANDER, E. Partial recoding of dental caries. *Acta odontologica scandinavica,* **18**:377 (1960).
18. UNITED NATIONS SUB-COMMISSION ON SAMPLING. *The preparation of sampling survey reports.* New York (United Nations Statistical Papers, Series C, No. 1).
19. INTERNATIONAL DENTAL FEDERATION. General principles concerning the international standardization of dental caries statistics. *International dental journal,* **12**:65 (1962).

Annex

TABLES THAT CAN BE PREPARED BY WHO WITH DATA FROM THE BASIC ORAL HEALTH ASSESSMENT AND THE COMBINED ORAL HEALTH AND TREATMENT NEED ASSESSMENT

Each table will be produced for the total sample and for each pertinent subgroup, e.g., ethnic group if applicable. Results will be tabulated for each year for ages from 2 to 19 years together with a composite 15–19 years age group. Thereafter, results will be tabulated in 5 or 10 year intervals as follows: 20–24, 25–29, 30–34, 35–44, 45–54, 55–64, and 65 years and over. All subjects will be included in these tables up to the age group 25–29 years. For older age groups tables will be produced for the total group but, where the number differs, tables omitting edentulous subjects will also be prepared. In general, subgroups containing fewer than 20 subjects will not be summarized separately but will be noted in the printout. Some tables refer to both assessments, others to one assessment only. The appropriate tables will be prepared from data sent to WHO.

A. Basic oral health assessments[a]

TABLE 1. AGE DISTRIBUTION OF SAMPLE

Age	N	%

TABLE 2. ETHNIC AND AGE GROUP DISTRIBUTION

Age	Ethnic group 1		Ethnic group 2		Ethnic group 3	
	N	%	N	%	N	%

TABLE 3. OCCUPATION AND AGE DISTRIBUTION

Age	Occupation 1		Occupation 2	
	N	%	N	%

TABLE 4. MEAN NUMBER OF PRIMARY AND PERMANENT TEETH PRESENT

Age	N	Mean no. of primary teeth	Mean no. of permanent teeth

TABLE 5. MEAN NUMBER OF UNERUPTED PERMANENT TEETH AND TEETH EXCLUDED FROM ASSESSMENT

Age	N	Mean no. of unerupted teeth (permanent teeth only)	Mean no. of teeth excluded from assessment	
			Primary	Permanent

TABLE 6. NUMBER AND PERCENTAGE OF SUBJECTS WITH DISORDERS OF MUCOSA, TEETH, AND BONE

Age	N	Oral mucosal disease		Defects of teeth		Diseases of bone	
		No.	%	No.	%	No.	%

TABLE 7. NUMBER AND PERCENTAGE OF SUBJECTS WITH SPECIFIED CONDITIONS

Age	N	Condition to be specified		Condition to be specified		Condition to be specified	
		No.	%	No.	%	No.	%

Tables 9 and 11 are the same as Table 7

TABLE 8. MEAN SCORE FOR SPECIFIED CONDITION

Age	N	Mean score

Tables 10 and 12 are the same as Table 8

[a] N = Total number of subjects examined in age or other groups.

TABLE 13. DENTOFACIAL ANOMALIES: WHO CRITERIA

Age	N	Subjects with dentofacial anomalies	
		No.	%

TABLE 14. DENTOFACIAL ANOMALIES: OTHER SPECIFIED CRITERIA

Age	N	Subjects with dentofacial anomalies	
		No.	%

TABLE 15. PROSTHETIC STATUS

Age	N	People with full upper denture		Subjects with full lower denture		Subjects with both full upper and full lower dentures	
		No.	%	No.	%	No.	%

TABLE 16. PERIODONTAL STATUS: NUMBER AND PERCENTAGE OF SUBJECTS AFFECTED

Age	N	Soft deposit		Calculus		Intense gingivitis		Advanced periodontal involvement	
		No.	% affected	No.	% affected	No.	% affected	No.	% affected

TABLE 17. PERIODONTAL STATUS: MEAN NUMBERS OF SEGMENTS INVOLVED

Age	N	Soft deposits: mean no. of segments involved	Calculus: mean no. of segments involved	Intense gingivitis: mean no. of segments involved	Advanced periodontal involvement: mean no. of segments involved

TABLE 18. TOOTH MORTALITY: MEAN NUMBER OF PRIMARY TEETH PREMATURELY MISSING FOR ANY REASON (UNDER AGE 9 YEARS)

Age	N	Mean no. of primary teeth prematurely missing

TABLE 19. MEAN NUMBER OF PERMANENT TEETH MISSING OWING TO CARIES (ALL AGES UNDER 30 YEARS)

Age	N	Mean no. of permanent teeth missing owing to caries

TABLE 20. MEAN NUMBER OF PERMANENT TEETH MISSING FOR ANY REASON OTHER THAN CARIES (ALL AGES UNDER 30 YEARS)

Age	N	Mean no. of permanent teeth missing for reasons other than caries

TABLE 21. MEAN NUMBER OF PERMANENT TEETH MISSING FOR ANY REASON (30 YEARS AND OLDER)

Age	N	Mean no. of teeth missing for all reasons
30-34		
etc.		

TABLE 22. NUMBER AND PERCENTAGE OF SUBJECTS WITH LESS THAN 21 TEETH OR LESS THAN 15 PERMANENT TEETH OR EDENTULOUS

Age	N	Less than 21 teeth		Less than 15 teeth		Edentulous	
		No.	%	No.	%	No.	%

TABLE 23. CARIES STATUS, PRIMARY TEETH (LESS THAN 9 YEARS) . I

Age	N	% with 1 or more dmf teeth (primary)	% with 1 or more d teeth (primary)	mean dft primary	mean dmft primary

TABLE 24. CARIES STATUS, PRIMARY TEETH (LESS THAN 9 YEARS). II

Age	N	mean d teeth	mean f teeth	mean f and primary decay teeth	mean f and secondary decay teeth	mean m teeth

TABLE 25. CARIES STATUS, PERMANENT TEETH. I

Age	N	% with 1 or more DMF teeth	% with 1 or more D teeth	mean DMFT

TABLE 26. CARIES STATUS, PERMANENT TEETH. II

Age	N	mean D teeth	mean F teeth	mean F and primary decay teeth	mean F and secondary decay teeth	mean M teeth

B. Combined oral health and treatment assessment[a]

TABLE 27. SUMMARY OF RESPONSES TO QUESTION 1

Age	N	Subjects stating they obtained care in the last 12 months	Subjects stating they did not obtain care in last 12 months	No data

[a] N = Total number of subjects examined in age or other groups

TABLE 28. RESPONSE TO QUESTION 1a

Age	N	Cleaning	Attention pain	Repair done	Check-up	Sent appointment for check-up	Other	Don't know

TABLE 29. RESPONSE TO QUESTION 1b

Age	N	Dentist	Therapist	Hygienist	Medical personnel	Other

TABLE 30. RESPONSE TO QUESTION 1c

Age	N	Nothing wrong	Afraid of dentists	Costs too much	Did not wish to spend the money	Too busy	No service	No teeth or false teeth	Other	Don't know

TABLE 31. RESPONSE TO QUESTION 2

Age	N	Nothing wrong	Teeth only	Gums only	Teeth and gums	Other	Don't know

TABLE 32. RESPONSE TO QUESTION 2a

Age	N	No	Yes	No data

TABLE 33. RESPONSE TO QUESTION 2b

Age	N	Preventive	Examination, cleaning	Scaling, periodontal	Fillings, crowns, etc.	Extraction, surgery	Dentures	Orthodontic care	More than 1 kind	Other	Don't know

TABLE 34. NUMBER AND PERCENTAGE OF SUBJECTS WITH DISORDERS OF MUCOSA, TEETH, OR BONE - NO TREATMENT RECOMMENDED

Age	N	Oral mucosal disorders: no treatment required		Defects of teeth: no treatment required		Disease of bone: no treatment required	
		No.	%	No.	%	No.	%

TABLE 35. NUMBER AND PERCENTAGE OF SUBJECTS WITH DISORDERS OF MUCOSA, TEETH, AND BONE - TREATMENT RECOMMENDED

Age	N	Oral mucosal disorders: treatment recommended		Defects of teeth: treatment recommended		Diseases of bone: treatment recommended	
		No.	%	No.	%	No.	%

TABLE 36. DENTOFACIAL ANOMALIES: WHO CRITERIA

Age	N	WHO criteria anomalies No.	%

Tables 38 and 39 are the same as Tables 36 and 37 for other specified criteria for dentofacial anomalies.

TABLE 37. TREATMENT REQUIRED FOR DENTOFACIAL ANOMALIES: WHO CRITERIA

Age	N	No treatment required		By extraction only		Treatment with removable appliance + extraction		Treatment with fixed appliance		Treatment for gross defects, surgical or other	
		No.	%	No.	%	No.	%	No.	%	No.	%

TABLE 40. PROSTHETIC STATUS: POSSESSING AND WEARING DENTURES

Age	N	Full upper		Partial upper		Full lower		Partial lower		Upper and lower, partial or full	
		No.	%	No.	%	No.	%	No.	%	No.	%

TABLE 41. PROSTHETIC STATUS: POSSESSING BUT NOT WEARING DENTURES

Age	N	Full upper		Partial upper		Full lower		Partial lower		Upper and lower, partial or full	
		No.	%	No.	%	No.	%	No.	%	No.	%

TABLE 42. DENTURE REQUIREMENTS: NEEDING NEW DENTURES

Age	N	Full upper		Partial upper		Full lower		Partial lower		Upper and lower, partial or full	
		No.	%	No.	%	No.	%	No.	%	No.	%

TABLE 43. DENTURE REQUIREMENTS: NEEDING REPAIR OF DENTURE

Age	N	Full upper		Partial upper		Full lower		Partial lower		Upper and lower, partial or full	
		No.	%	No.	%	No.	%	No.	%	No.	%

TABLE 44. SUBJECTS REQUIRING PERIODONTAL TREATMENT

Age	N	No treatment		Oral health instruction		Prophylaxis and oral health instruction	Periodontal therapy, no extraction	Periodontal therapy and extraction	Full extraction
		No	%	No.	%				

TABLE 45. PRIMARY DENTITION TREATMENT REQUIREMENTS. I

Age	N	No treatment		1 surface restoration		2 surface restorations	
		No.	%	No.	%	No.	%

TABLE 46. PRIMARY DENTITION TREATMENT REQUIREMENTS. II

Age	N	3 surface restorations		More than 3 surface restorations		Extractions for caries	
		No.	%	No.	%	No.	%

TABLE 47. MEAN NUMBER OF PRIMARY TEETH REQUIRING TREATMENT. I

Age	N	No treatment	1 surface restoration	2 surface restorations

TABLE 48. MEAN NUMBER OF PRIMARY TEETH REQUIRING TREATMENT. II

Age	N	3 surface restorations	More than 3 surface restorations or crowns	Extractions for caries

TABLE 49. PERMANENT DENTITION: RESTORATIVE CARE REQUIRED

Age	N	No treatment		1 surface restoration		2 surface restorations		3 surface restorations		More than 3 surface restorations or crowns	
		No.	%	No.	%	No.	%	No.	%	No.	%

TABLE 50. MEAN NUMBER OF PERMANENT TEETH REQUIRING TREATMENT. I

Age	N	No treatment	1 surface restoration	2 surface restorations

TABLE 51. MEAN NUMBER OF PERMANENT TEETH REQUIRING TREATMENT. II

Age	N	3 surface restorations	More than 3 surface restorations or crowns	Extractions for caries

TABLE 52. PERMANENT DENTITION: EXTRACTIONS

Age	N	Caries	Periodontal disease	Dentures	Other reasons

TABLE 53. MEAN NUMBER OF PERMANENT TEETH REQUIRING EXTRACTIONS

Age	N	Caries	Periodontal disease	Dentures	Other reasons

TABLE 54. CONDITIONS NEEDING IMMEDIATE ATTENTION

Age	N	Relief of pain or infection	Treatment of lesions likely to cause pain	Treatment of pulpally involved teeth	Other

C. Tables for duplicate and/or between-examiner assessment[a]

Tables will be prepared for duplicate examination comparisons and between-examiner comparisons, as appropriate, for 3 age groups only.

TABLE 55. COMPARISONS OF RESULTS FOR DENTAL CARIES

Caries	Age	N	% DMF affected	% affected D	D	M	F	F + primary decay	F + secondary decay	Mean DMFT
1st exam.										
duplicate exam.										

TABLE 56. PERCENTAGE DIFFERENCE BETWEEN FINDINGS FOR DENTAL CARIES

Age	% affected DMF	% affected D	D	M	F	F + primary decay	F + secondary decay	Mean DMFT

TABLE 57. COMPARISON OF RESULTS FOR PERIODONTAL STATUS

Periodontal disease	Age (for each age)		
	Condition	N % affected	Mean no. of segments involved
1st examination	Soft deposits		
duplicate			
1st examination	Calculus		
duplicate			
1st examination	Intense gingivitis		
duplicate			
1st examination	Advanced periodontal involvement		
duplicate			

[a] N = Total number of subjects examined in age or other groups

TABLE 58. PERCENTAGE DIFFERENCES BETWEEN FINDINGS FOR PERIODONTAL STATUS

Age	Soft deposits	Calculus	Intense gingivitis	Advanced periodontal involvement

TABLE 59. COMPARISON OF RESULTS FOR PERIODONTAL TREATMENT ASSESSMENT

Age	N	Treatment	Requiring oral health instruction	Requiring prophylaxis and oral health instruction	Requiring periodontal therapy, no extractions	Requiring periodontal therapy and extractions	Full extraction
		No. %	No. %	No. %	No. %	No. %	No. %
1st exam.							
duplicate exam.							

TABLE 60. PERCENTAGE DIFFERENCE BETWEEN FINDINGS FOR PERIODONTAL TREATMENT ASSESSMENT

Age				iodontal rapy and ractions	Full extraction

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Unknown
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c bra n/a

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